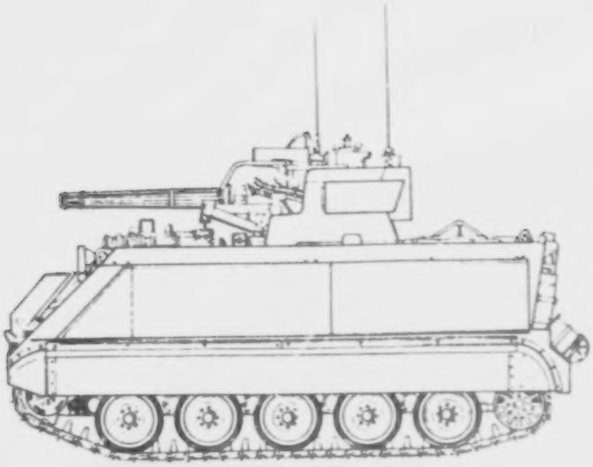
9-1265-201-10

TM 9-1265-201-10
Supersedes copy dated 19 October 1984.

OPERATOR'S MANUAL
FOR
MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES)
SIMULATOR SYSTEM, FIRING, LASER: M75
(NSN 1265-01-159-0484)
FOR
VULCAN/PRODUCT IMPROVED VULCAN AIR DEFENSE SYSTEM, SELF-PROPELLED



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HEADQUARTERS, DEPARTMENT OF THE ARMY

AUGUST 1988

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READEX FICHE best copy available

WARNING

Although the laser light emitted by MILES laser transmitters is considered eye safe by the U. S. Army Environmental Hygiene Agency, Aberdeen Proving Grounds, suitable precautions must be taken to avoid possible eye damage from overexposure to this radiated energy. Precautionary measures include the following:

- **NEVER look at a laser emitter at close range** (less than 12 meters). Increasing the eye-to-laser distance greatly reduces the risks of overexposure.
- **NEVER look at a laser emitter** directly along the **optical axis** of the radiated beam.
- **NEVER look along the axis of a laser emitter through magnifying optics** at engagement ranges of less than **75 meters** for STINGER, VULCAN, and TOW, and **110 meters** for the CHAPARRAL.
- **Avoid allowing personnel** with optics of **higher transmission or magnifying power than normal tank** optics to view STINGER, VULCAN, or TOW within **150 meters** or the CHAPARRAL within **330 meters**.

Primer is highly inflammable. Do not spray near Heat, Sparks, or Open Flame. No Smoking. Use only in well-ventilated area.

Ensure VULCAN cannon motor connector W3P3 is disconnected. Failure to disconnect connector can cause damage to equipment and/or injury to personnel.

The Gunner must exercise caution when entering or leaving the Gunner's compartment to prevent possible injury to left leg/knee from the ICA mounting bolts.

When operating in "Buttoned Up" conditions, the driver suffers some loss of visibility due to the cables which are routed through the left side periscope port of the Drivers hatch. Drivers must be made aware of the situation and take appropriate actions to ensure safe vehicle operation under these conditions. Failure to comply may cause damage to equipment and/or injury to personnel.

If task requires Vehicle and/or MILES Equipment Power to be turned ON, ensure Vehicle and/or MILES Equipment Power is turned OFF upon completion of task. Failure to comply may result in Personal Injury or Equipment Damage.

For information on **FIRST AID**, see FM 21-11.

TECHNICAL MANUAL
No. 9-1265-201-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 15 AUGUST 1988

OPERATOR'S MANUAL
FOR
MULTIPLE INTEGRATED LASER ENGAGEMENT SYSTEM (MILES)
SIMULATOR SYSTEM, FIRING, LASER: M75
NSN 1265-01-159-0484
FOR
VULCAN/PRODUCT IMPROVED VULCAN
AIR DEFENSE SYSTEM,
SELF-PROPELLED

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to: Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000. A reply will be furnished to you.

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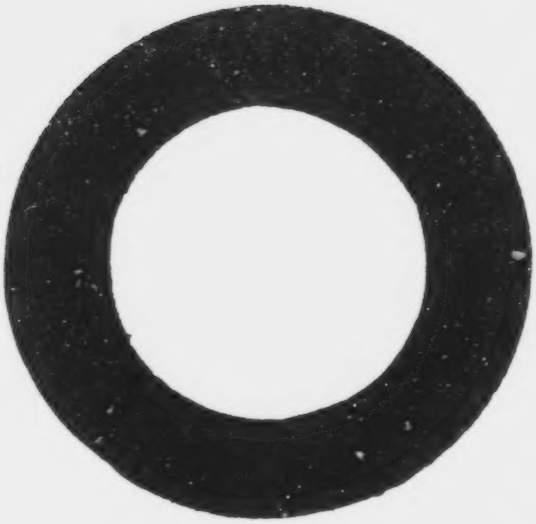
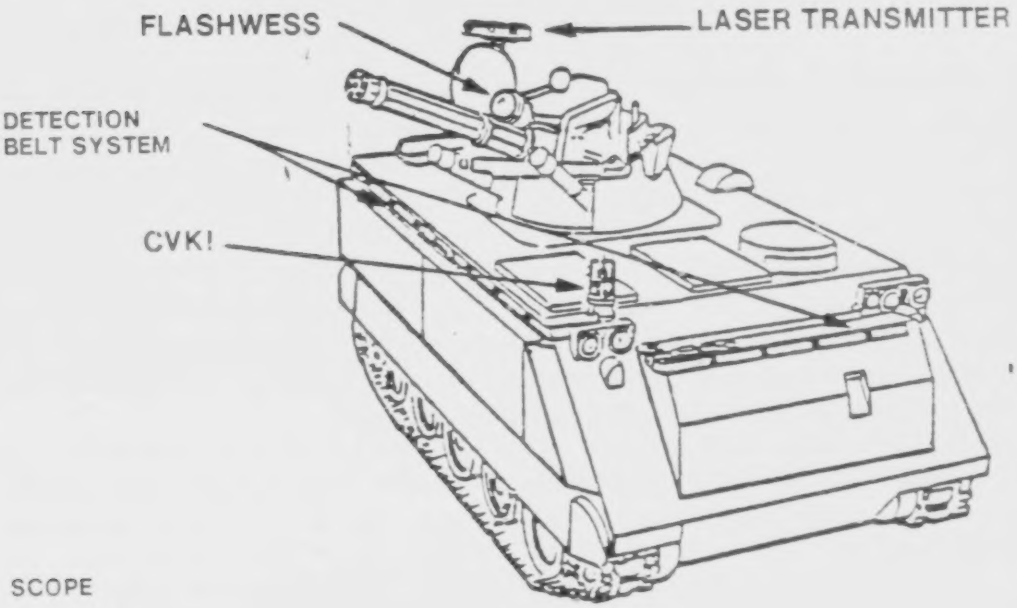


CHAPTER 1

INTRODUCTION

SECTION I. GENERAL INFORMATION



SCOPE

NOTE

Unless otherwise specified in this manual, the term VULCAN refers to Vulcan Air Defense System (VADS) and Product Improved Vulcan Air Defense System (PIVADS), Self-Propelled.

TYPE OF MANUAL. This manual shows you how to inspect, install, operate, and maintain MILES AGES/AD equipment for the VULCAN, Self-Propelled, Weapon System. Step-by-step instructions are given in the procedures necessary to use the MILES system.

This manual covers only authorized Operator maintenance. Any maintenance problems not covered should be referred to Organizational ("O" level) maintenance personnel.

NOTE

To use this manual you should be able to:

1. Boresight, aim, and fire the Vulcan weapon (Ref. TM 9-2350-300-10 (VADS), TM 9-2350-310-10 (PIVADS)).
2. Complete DA Form 2402 and 2404.

If you cannot do these tasks, ask your NCOIC or Instructor to show you how. When you can do these tasks, go on with this manual.

PURPOSE OF EQUIPMENT. MILES AGES/AD VULCAN simulator system equipment (M75) for the Vulcan, Self-Propelled, Weapon System consists of a laser transmitter and detection system. It permits realistic combat training without the hazards of using live ammunition. A weapon signature simulator (flash device) is provided to simulate actual weapon firing.

LIMITATION ON EQUIPMENT. MILES-equipped weapons have the same range and operational capabilities as the real weapons. A dirty laser transmitter lens may reduce the effective range of a transmitter. The mission profiles for the MILES VULCAN system cover both air defense and ground targets. Ground targets may only be engaged with weapon in the MANUAL mode. The MILES VULCAN system is effective against MILES-equipped aircraft, vehicles, and personnel.

MAINTENANCE FORMS AND RECORDS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

HAND RECEIPT MANUAL. This manual has a companion document with a TM number followed by "-HR" (which stands for Hand Receipt). The TM 9-1265-201-10-HR consists of preprinted hand receipts (DA Form 2062) that list end item related equipment (i.e., COEI, BII, AAL) you must account for. As an aid to property accountability, additional -HR manuals may be requisitioned from the following source in accordance with procedures in Chapter 3, AR 310-2:

Commander
The U. S. Army Adjutant General Publications Center
2800 Eastern Boulevard
Baltimore, MD 21220

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS). If your MILES equipment for the VULCAN, Self-Propelled, Weapon System, needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail the Quality Deficiency Report to us at Commander, U. S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD, Rock Island, IL 61299-6000. A reply will be furnished to you.

REFERENCE INFORMATION

This listing includes the Nomenclature Cross Reference List, List of Abbreviations, and an explanation of terms (Glossary) used in this Technical Manual.

NOMENCLATURE CROSS REFERENCE LIST

Common Name	Official Nomenclature
Adapter Set	Adapter Set, Simulator System, Laser: VULCAN, Self-Propelled
Battery Box	Battery Box Assembly
Control Indicator Assembly (CIA)	Console, Simulator System, Laser: For M113 APC
Detector Belt	Detector Belt Assembly, Segment No. 1; Segment No. 2
Interface Control Assembly (ICA)	Adapter Assembly, Simulator System, Laser: Console, Vehicle Interface
Kill Indicator (CVKI)	Indicator, Simulator System, Laser: Combat Vehicle KILL/HIT/MISS
VULCAN, Self-Propelled, Simulator (MILES VULCAN)	Simulator System, Firing, Laser: VULCAN, Self-Propelled
VULCAN (20 mm Cannon) Transmitter	Transmitter Assembly, Simulator System, Laser: VULCAN, Self-Propelled
20 mm Cannon FLASHWESS	Adapter Assembly, Simulator, Weapon Fire

LIST OF ABBREVIATIONS

AGES/AD	Air-to-Ground Engagement System/Air Defense
CIA	Control Indicator Assembly
CVKI	Combat Vehicle Kill Indicator
ICA	Interface Control Assembly
IR	Infrared Radiation
MILES	Multiple Integrated Laser Engagement System
PMCS	Preventive Maintenance Checks and Services

ROR	Range Only Radar
SP	Self-Propelled
XMTR	Transmitter

GLOSSARY

Combat Vehicle Kill Indicator	MILES device attached to vehicles to provide external flashing light. Indicates that vehicle is under opposing fire ("NEAR MISS"), has been "HIT" or "KILLED".
Control Indicator Assembly	Receives detected laser pulse signals from detector belts. Decodes these signals and activates appropriate audio and visual alarms. Displays information on attacking weaponry.
Controller	Umpire or Referee in a MILES training exercise.
Controller Gun	Device used to test MILES detector systems. Also used to disqualify soldiers or vehicles from an exercise.
Controller Key	Green key used by Controller to reset MILES transmitters and control consoles.
Fastener Tape	Hook and pile tape. Used to hold vehicle detector belts and other MILES equipment in place.
FLASHWESS	Device that simulates the flash of 20 mm cannon firing.
HIT	Simulated contact with opposing fire insufficient to disable vehicle or cause a fatality.
Interface Control Assembly	Contains electronic circuitry to activate the laser transmitter when the weapon trigger is pressed.
KILL	Simulated contact with opposing fire sufficient to disable vehicle or cause a fatality.
Laser	Light Amplification by Stimulated Emission of Radiation.
Laser Beam	Invisible beam of light which simulates weapon fire.
Laser Detector Assembly	Device that senses laser beams directed at it.
Laser Transmitter	Device that sends laser beam.

NEAR MISS	Simulated closeness to contact with opposing fire.
Simulator	Training device which takes the place of real equipment and which has many of its characteristics.
Weapon Key	Orange key used to activate ICA. Silences vehicle intercom when inserted in Control Indicator Assembly. Also used to "SELF KILL" Vulcan.

SECTION II. EQUIPMENT DESCRIPTION

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

PURPOSE OF MILES SIMULATOR SYSTEM, LASER: VULCAN, SELF-PROPELLED

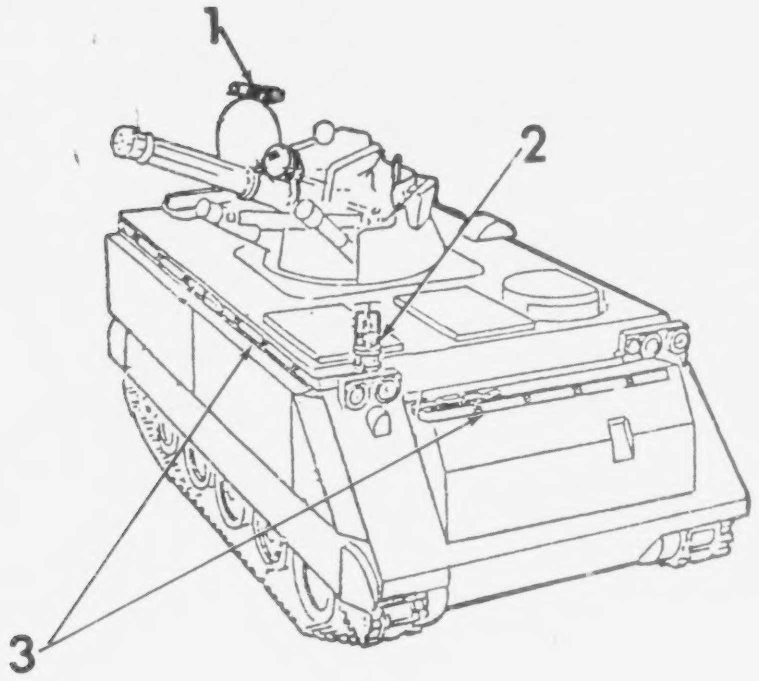
The MILES Simulator System, Laser: VULCAN, Self-Propelled, permits the vehicle to take part in realistic combat training exercises. Actual firing conditions of vehicle weaponry is simulated using laser beams. A FLASHWESS device adds to the system's realism.

Laser detectors mounted on the VULCAN, Self-Propelled sense enemy fire. MILES system electronics determine the accuracy and simulated damage of enemy fire. The system also detects the type of weapon directing enemy fire against the VULCAN, Self-Propelled.

FEATURES AND CAPABILITIES

- Easily installed and removed.
- Simulates firing capability of VULCAN 20 mm cannon.
    1. Firing rate
    2. Burst rate
    3. Range
- FLASHWESS device adds realism.
- Uses normal weapon firing procedures.
- Detects all opposing fire.
    1. Attacking weapon accuracy
        a. "NEAR MISS"
        b. "HIT"
        c. "KILL"
    2. Attacking weapon identification
- Uses eye safe battery-powered laser transmitters.
- Operates in temperatures from −35°C (−31°F) to 62°C (144°F).
- Compatible with all other MILES training devices.
- High visibility CVKI strobe light signals vehicle "NEAR MISS," "HIT," or "KILL."

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

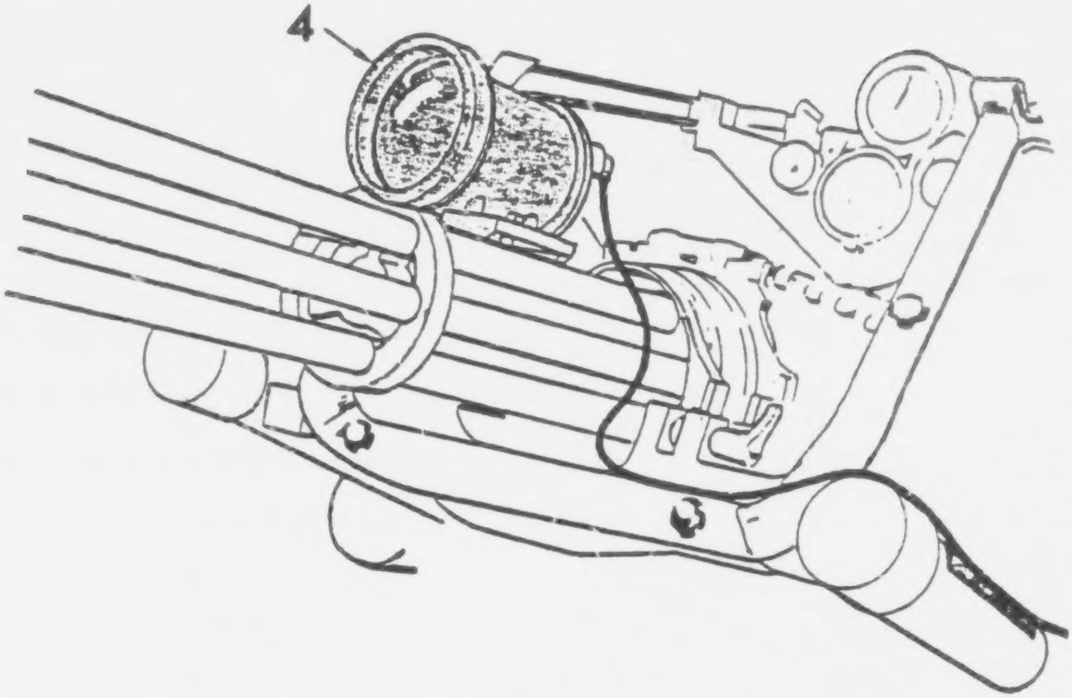


__20 mm Cannon Laser Transmitter/Modulator (1)__. Simulates firing effects of 20 mm cannon by transmitting a coded laser signal. Mounts on Range Only Radar (ROR) antenna.

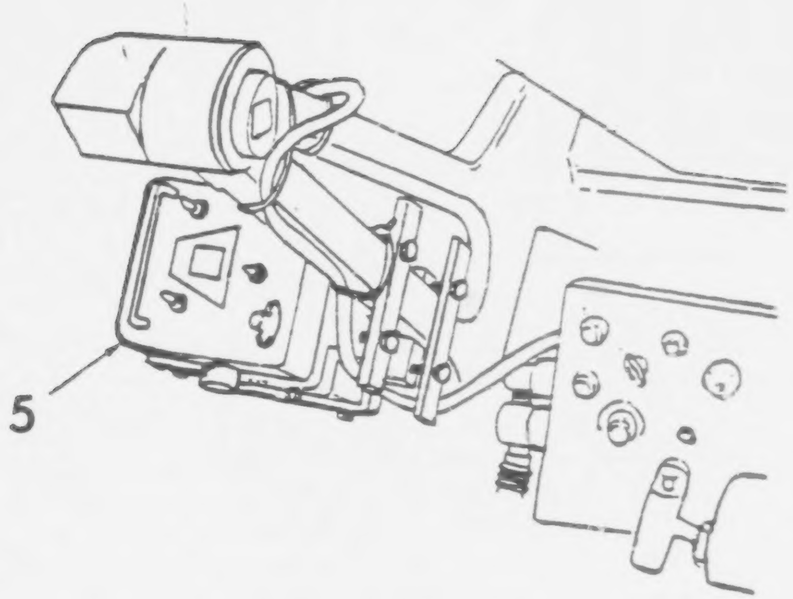
__CVKI (2)__. Flashes strobe light for a "KILL," "HIT," or "NEAR MISS" indication. Mounts on top of right front headlight guard.

__Detection Belt System (3)__. Receives laser pulses from MILES-equipped opposing weapons. Generates, amplifies and routes electrical signals to Control Indicator Assembly for determining whether signal was a "NEAR MISS," "HIT," or "KILL." Mounts on sides, front and rear of VULCAN, Self-Propelled vehicle.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Cont)

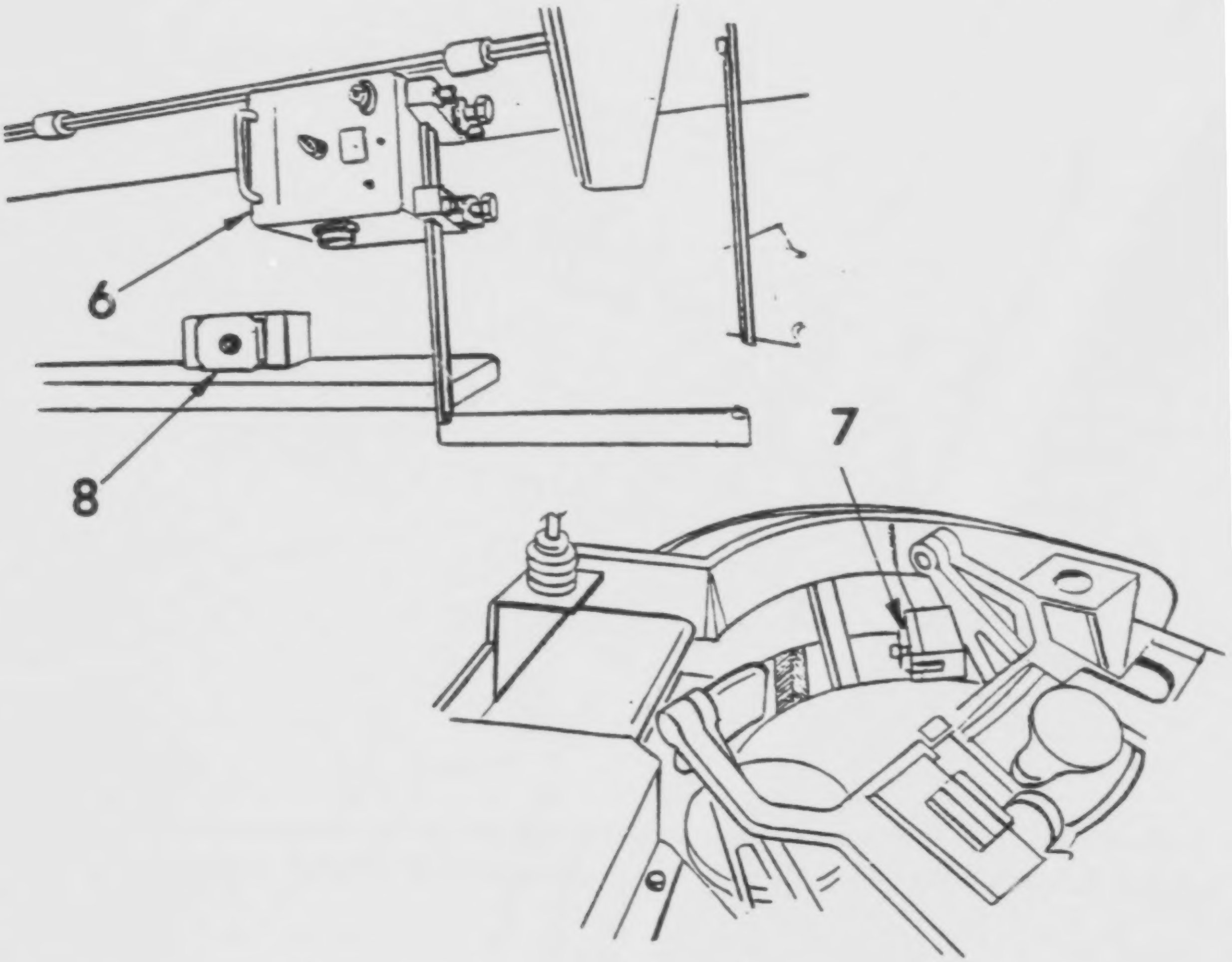


FLASHWESS (4). Lamp device powered by 24 V dc vehicle power. Flashes 120 times per minute when activated by gun system. Simulates light flashes generated by firing live ammunition. Attaches to 20 mm cannon barrels.



Interface Control Assembly (ICA) (5). Provides interface with actual VULCAN weapon firing system and laser transmitter. ICA panel displays total and ready rounds remaining and indicates laser firing. Switches are used to select total and ready rounds remaining indication and to reload system. Mounts inside turret on left side of 20mm cannon elevation pivot frame.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (Cont)



Control Indicator Assembly (CIA) (6). Receives detected laser pulse signals from detector belts, decodes these signals, and actuates appropriate audio and visual alarms associated with CVKI and intercom. Has key receptacle for initializing and resetting system. A HIT/KILL identification display is also provided. Mounts inside vehicle on right side.

Battery Box (7), (8). Contains two 6 V batteries for operating the laser transmitter, detection system, CIA, and ICA. There are two battery boxes. One is mounted inside turret at left side near gun support panel (7). Other is installed on night sight shelf near CIA (8).

EQUIPMENT DATA

Table 1-1. MILES VULCAN, Self-Propelled, Equipment Data

20 mm Cannon Laser Transmitter Characteristics			
Effective Standoff Range	**Basic Load (rounds)**	**Firing Rate (rounds/ minute selectable)**	**Burst Rate**
1500 meters	1100 Ready 900 Stored	1000-3000	10, 30, 60, 100
Detector Assemblies	**Weight (Pounds)**	**Dimensions (Inches)**	**Number of Detectors**
Belt #1	1.375	167 x 2	6
Belt #2	1.5	91 x 2	4
Equipment	**Weight (Pounds)**	**Dimensions (Inches)**	
CVKI (without adapter)	11.62	14 x 7.3 (diameter)	
CIA (without adapter)	7.82	10.5 x 5.5 x 5.8	
Battery Box Assembly	1.31	7 x 5 x 4	
Laser Transmitter	2.0	3 x 4 x 7-1/2	
Modulator	4.5	3 x 4 x 12-1/2	
ICA	8.0	5 x 5-1/2 x 8-1/2	
FLASHWESS	8.5	6 x 5-1/8 (diameter)	

SECTION III. TECHNICAL PRINCIPLES OF OPERATION

BASIC PRINCIPLES OF OPERATION

The MILES system uses semiconductor laser beams to simulate actual weapon fire. An eye-safe invisible laser beam is sent out by each weapon's transmitter when it is fired. The laser beam is coded and simulates all of the weapon's capabilities including range, accuracy and destructive capability.

Laser detection systems are used to sense opposing fire. The detection systems detect opposing laser beams and determine whether they have scored a "NEAR MISS," "HIT," or "KILL." The systems activate alarms indicating the presence and damage of opposing fire.

The MILES system of laser beam transmitters and detectors allows safe realistic training exercises with a complete range of weaponry and vehicles.

MILES VULCAN CONFIGURATION

The VULCAN 20 mm cannon is equipped with a laser transmitter that is fired using normal weapon operating procedures. Special detector belts that sense opposing fire are attached to the vehicle's exterior. A Control Indicator Assembly (CIA) mounted inside the vehicle determines the extent of opposing fire and its effect. A flashing light (CVKI) mounted on the vehicle's exterior is activated by the CIA when opposing fire is detected.

MILES-EQUIPPED GUN FIRING

The 20 mm MILES-equipped VULCAN cannon is fired using normal weapon procedures. A FLASHWESS device is used to add realism to gun firing. When the gun trigger is operated, this device and a laser transmitter mounted on the Range Only Radar (ROR) fire together.

The 20 mm cannon may be fired in either MANUAL mode or RADAR mode. Three separate laser tubes are located inside the MILES laser transmitter. When the cannon is locked on a target all three laser tubes will fire in the RADAR mode. The RADAR mode is used for airborne targets. Only the center tube fires in the MANUAL mode. The MANUAL mode is used for ground or aerial targets. The GROUND mode is not used with the MILES system.

The MILES system allows a basic load of 2000 laser rounds for the 20 mm cannon. 1100 laser rounds may be kept in the READY mode with the remaining rounds (900 maximum) kept in a STORED mode.

After firing, you can check to see how many rounds the MILES system has left. This is done by turning a switch on the Interface Control Assembly (ICA) to either READY or TOTAL. The displayed number multipled by 100 equals the rounds remaining.

A simulated reload of the 20 mm cannon is accomplished by pushing the PRESS TO RELOAD button on the ICA. Each time the button is pressed 100 rounds are transferred from the stored mode to the ready mode. There is a one minute delay for each reload of 100 rounds. The laser transmitter cannot be fired during reloading.

WEAPON SIGNATURE SIMULATION

The FLASHWESS device uses a high intensity strobe lamp to simulate the light flash of actual gun firing. The device will flash approximately 120 times per minute.

DRY-FIRE OPERATION

The laser transmitters on all MILES-equipped weapons can be fired without using a FLASHWESS device. Usually, this dry-fire mode is used only to test and boresight the equipment. The FLASHWESS is electrically disconnected when the Controller sets the ICA to TEST mode.

VEHICLE DETECTION SYSTEM

Four detector belts containing 20 detectors are mounted on the exterior of the VULCAN, Self-Propelled. Opposing fire is sensed by the detectors. They generate electrical signals which are fed to a decoder in the Control Indicator Assembly (CIA).

The decoder identifies the type of weapon that fired the opposing laser beam. It determines whether the laser shot was accurate enough to cause a "HIT" or whether a "NEAR MISS" occurred. It also determines if the weapon was capable of causing damage to the target (an M16 rifle, for example, cannot disable the VULCAN vehicle) and the probability of "KILL" for that weapon. The probability of "KILLING" a target is different for each attacking weapon.

If a detector on the VULCAN is hit by laser fire, one of three things will happen.

1. Two tones will sound in the vehicle intercom and CVKI light mounted on the tank exterior will flash two times. This means a "NEAR MISS" occurred.
2. Four to six tones will sound in the intercom and CVKI light will flash four or six times. This means a "HIT" but not a "KILL" occurred.
3. The intercom tone will sound continuously and CVKI light will flash continuously. This means a "KILL" occurred.

The VULCAN crew can determine what type of weapon has fired on them by turning a switch on the MILES Control Indicator Assembly and pushing a display button. A code number indicating the attacking weapon will appear on the display following a "HIT" or "KILL." No code number appears for "NEAR MISS."

The intercom is turned off after a "KILL" by:

- removing the Weapon (Orange) Key from the ICA
- inserting the key into the CIA key receptacle
- turning the key to WEAPON.

If the key is removed from the CIA, the intercom tone will begin again. The CVKI light continues to flash until reset by a Controller.

CHAPTER 2

OPERATING INSTRUCTIONS

SCOPE. This chapter provides those instructions needed by the VULCAN crew to inspect, install, checkout, operate, and remove MILES VULCAN, Self-Propelled, equipment.

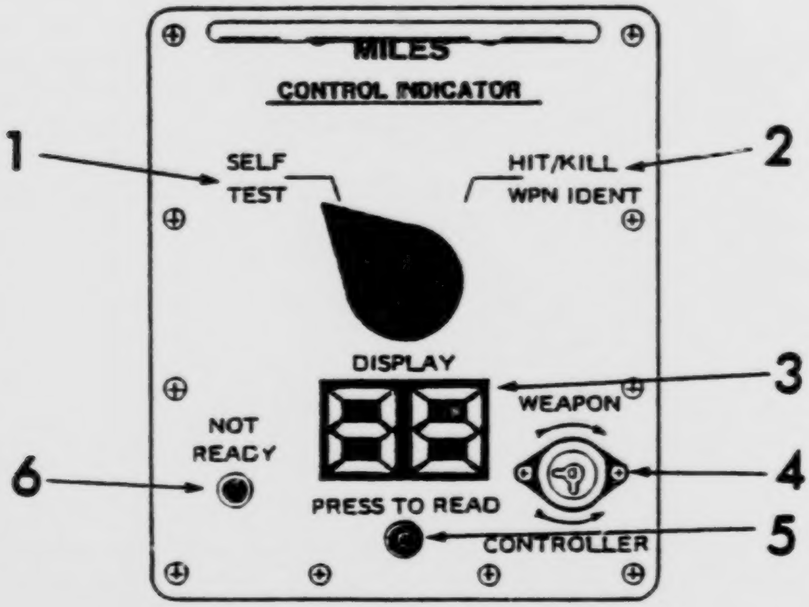
SECTION I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

MILES VULCAN, SELF-PROPELLED, CONTROLS AND INDICATORS. The MILES VULCAN Controls and Indicators are only those associated with the Control Indicator Assembly (CIA) and Interface Control Assembly (ICA). All other Controls and Indicators, such as triggers and arming switches, are those actually associated with the weapons.

CONTROL INDICATOR ASSEMBLY (CIA) CONTROLS AND INDICATORS. Controls and indicators for the CIA are listed in Table 2-1.

Table 2-1. Control Indicator Assembly Controls and Indicators

Key Illustration	Description	Function	Operating Position
1	SELF TEST	Performs self test.	Turn to SELF TEST. Press PRESS TO READ. Display should read 88.
2	HIT/KILL WPN IDENT	Identifies weapon firing on you.	Turn to HIT/KILL. Press PRESS TO READ. Display will show a number if detection system has been hit or killed
3	DISPLAY	Displays numbers.	
4	WEAPON/ CONTROLLER	Resets system or silence alarm.	Turn Weapon (Orange) Key to WEAPON to silence alarm or SELF KILL. Turn Controller (Green) Key to CONTROLLER to reset.
5	PRESS TO READ	Activates display.	Press to activate display.
6	NOT READY	Lights when not ready, or "KILLED."	


MILES
CONTROL INDICATOR
1
SELF TEST
HIT/KILL
WPN IDENT
2
DISPLAY
3
WEAPON
NOT READY
4
6
PRESS TO READ
CONTROLLER
5

Control Indicator Assembly Controls and Indicators

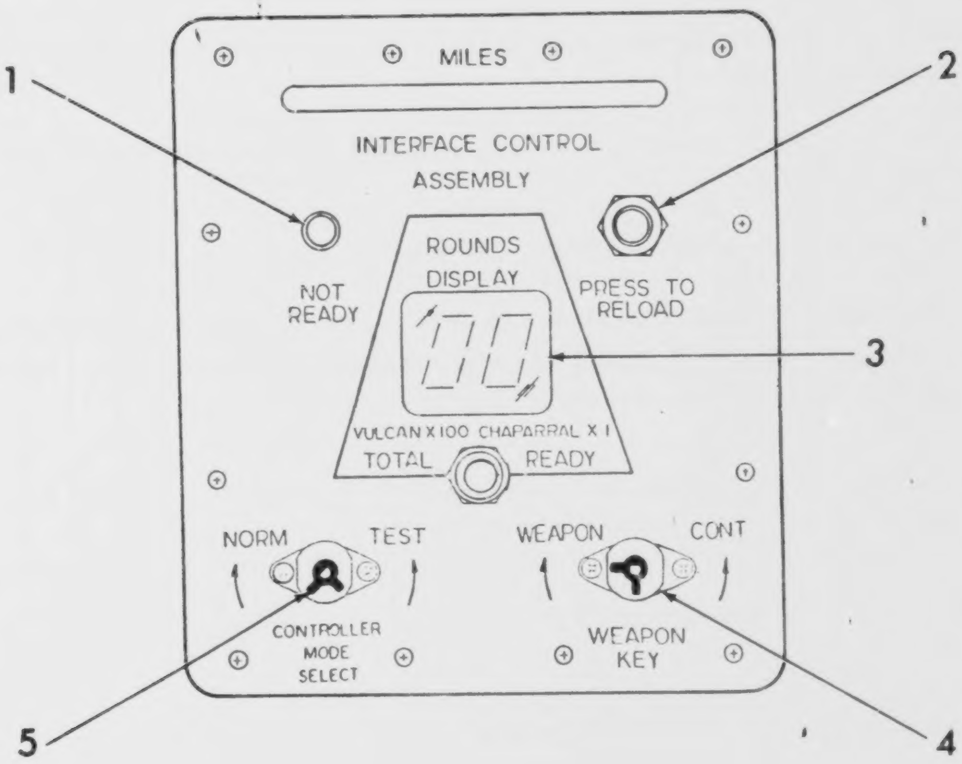
INTERFACE CONTROL ASSEMBLY (ICA) CONTROLS AND INDICATORS. Controls and indicators for the ICA are listed in Tables 2-2 and 2-3.

Table 2-2. Interface Control Assembly Controls and Indicators (Not ready light and rounds display)

Not ready Light status	Rounds display Switch position	Display Reading	Indication
ON	TOTAL OR READY	00	CONTROLLER KEY REQUIRED
OFF	TOTAL	1 to 20	TOTAL ROUNDS REMAINING (number multiple times 100)
OFF	READY	1 to 11	ROUNDS READY TO FIRE (number multiple times 100)
ON	TOTAL	0	ALL ROUNDS EXPENDED
ON	READY	0	RELOAD REQUIRED
ON	TOTAL OR READY	BLANK	RELOADING
ON	TOTAL	1 to 20	KILLED OR WEAPON KEY REQUIRED
ON	READY	1 to 11	KILLED OR WEAPON KEY REQUIRED
ON	CENTER	DECIMAL FLASHING	LASER FIRING

Table 2-3. Interface Control Assembly Controls and Indicators

Key Illustration	Description	Function	Operating Position
1	NOT READY	Light Emitting not ready	Lights when ON when: • Weapon key not engaged • Needs reset • During ammo reload time • Ready rounds equal zero OFF when: • Ready to fire
2	PRESS TO RELOAD	Reloads system	(Refer to Table 2-2)
3	ROUNDS DISPLAY - TOTAL, READY	Displays rounds status	(Refer to Table 2-2)
4	WEAPON KEY WEAPON/ CONT	Resets/turns system on	Weapon key in WEAPON position turns system on. Controller key in CONT position resets system.
5	CONTROLLER MODE SELECT NORM/TEST	Selects normal or test mode	Turn Controller key to NORM for normal operation. Turn to TEST to fire laser without FLASHWESS.


1
2
3
4
5
MILES
INTERFACE CONTROL
ASSEMBLY
NOT
READY
ROUNDS
DISPLAY
PRESS TO
RELOAD
VULCAN X 100 CHAPARRAL X 1
TOTAL
READY
NORM
TEST
WEAPON
CONT
CONTROLLER
MODE
SELECT
WEAPON
KEY

Interface Control Assembly Controls and Indicators

SECTION II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

GENERAL. Preventive Maintenance Checks and Services will ensure that the MILES equipment will always be ready for operation and perform satisfactorily throughout its mission. Preventive maintenance checks consist of performing a systematic inspection to discover defects before they result in operational failure of the equipment. Defects or malfunctions discovered by the crew during use of the MILES equipment, or as a result of performing maintenance checks and services, will be reported using the proper forms. If you find any problems, turn the item in to the issuing facilities.

(1) Before you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your "Before" (B) PMCS.

(2) While you operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your "During" (D) PMCS.

(3) After you operate. Be sure to perform your "After" (A) PMCS.

(4) If your equipment fails to operate. Troubleshoot with proper equipment. Ask your Controller to check your equipment. Report any deficiencies using the proper forms. See DA PAM 738-750.

Table 2-4. Operator/Crew Preventive Maintenance Checks and Services

NOTE

Within designated interval, these checks are to be performed in the order listed.

B – Before Operation D – During Operation A – After Operation W – Weekly Operation M – Monthly Operation

Item No.	Interval					Item to be Inspected	Procedures · Check for and have repaired or adjusted as necessary	Equipment Is Not Ready/ Available If:
	B	D	A	W	M			
1	•					Batteries	Inspect for acid leakage.	Acid is present.
2	•					Battery Box	Inspect for damaged connectors. Check that connectors and interior battery contacts are serviceable.	Connectors are broken or contacts are rusted or damaged.
3	•					Cable Assemblies	Inspect for broken connectors and cut, worn, or bare wiring.	Connectors are broken or wiring is cut or bare.
4	•	•	•			Transmitter Assembly	Inspect for dirty or damaged lens. Check connector for damage.	Lens or connectors are damaged.
5	•					ICA	Inspect for cracks in display window.	Display window is cracked.
							Check that weapon key turns freely in WEAPON KEY receptacle.	Weapon key does not turn freely.
							Check that controller key turns freely in MODE SELECT receptacle.	Controller key does not turn freely.
							Inspect for evidence of switch damage.	Switch is damaged.
6	•	•				Detector Belts Segments (3)	Look for loose or cracked detectors or damaged connectors.	Detectors are loose or cracked; connectors are damaged.

Table 2-4. Operator/Crew Preventive Maintenance Checks and Services (Cont)

NOTE

Within designated interval, these checks are to be performed in the order listed.

B – Before Operation	D – During Operation	A – After Operation	W – Weekly Operation	M – Monthly Operation

Item No.	Interval					Item to be Inspected	Procedures - Check for and have repaired or adjusted as necessary	Equipment Is Not Ready/ Available If:
	B	D	A	W	M			
7	•	•				CVKI	Inspect for cracks in plastic lens.	Lens is cracked.
							Inspect for damaged receptacle.	Receptacle is damaged.
							Inspect for stripped mounting bracket threads.	CVKI cannot be securely mounted
8	•	•				CIA	Inspect for cracks in display window.	Display window is cracked.
							Check that weapon key turns freely in WEAPON KEY receptacle.	Weapon key does not turn freely
							Inspect for evidence of switch damage.	Switch is damaged.
9	•					FLASHWESS	Inspect for cracks or damage to lens.	Lens is damaged.

SECTION III. OPERATION UNDER USUAL CONDITIONS

GENERAL. Before the MILES equipment can be used, it must be properly installed on the VULCAN Weapon System, Self-Propelled. To speed up procedures, work has been organized into various tasks. While some crew members are performing one set of tasks, others can be performing another set.

Before you begin, **READ ALL STEPS IN THE TASK AND LOOK AT EACH ILLUSTRATION CAREFULLY**. To help perform a task, most steps have reference numbers to illustrations. Do each step just the way you are instructed and in the order in which it occurs in this manual.

NOTE

Don't jump ahead. Don't skip any steps.

If your MILES equipment has a problem you can't fix using this manual, report it on DA Form 2402. To get a replacement, turn in the faulty equipment and the completed form.

TASK ASSIGNMENT. The squad leader assigns crewmen to tasks. The crewman turns to the appropriate section in this manual and performs the required steps in order. Occasionally, the manual may tell a crewman to wait until he has made sure that another crewman has completed an earlier task. On some tasks, two crewmen may have to work together.

Certain steps must be done with the Controller present. A Controller key, carried only by the Controller, is required to reset the system. The squad leader will determine when to call the Controller.

Those tasks involving the Controller must be done in this order, after installation

1. Test Task 1 (CIA/CVKI Test) (See page 2-67)
2. Test Task 2 (Detector Belt Test) (See page 2-69)
3. Test Task 3 (ICA Test) (See page 2-70)
4. Test Task 4 (VULCAN Transmitter Test) (See page 2-72)
5. Operational Task 3 (Recognizing Enemy Fire) (See page 2-79)
6. Operational Task 4 (Resetting After a "KILL") (See page 2-81)

The Squad Leader should coordinate the tasks, give assistance to any crewman who needs it, and check to make sure everything gets done.

NOTE

Unless otherwise indicated, references in this manual to right and left sides of VULCAN, Self-Propelled, use the seated Driver as a standard.

LIST OF TASKS

Tasks	Page
Assembly and Preparation for Use	
Preinstallation Task	2-10
Outside installation Tasks	2-11
Inside Installation Tasks	2-38
Outside Cabling Tasks	2-43
Inside Cabling Tasks	2-54
Initial Adjustments, Daily Checks and Self Test	
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Operational Tasks	2-75
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ASSEMBLY AND PREPARATION FOR USE

Preinstallation Task.

Obtain all equipment needed to install and operate MILES VULCAN, self-propelled, system from your NCOIC.

NOTE

> Preparing the VULCAN, Self-Propelled, for MILES training requires two transit cases of MILES equipment. A MILES case for the M113 APC and a MILES case for the VULCAN, Self-Propelled, must both be obtained. Not all equipment in the cases will be used. See Outside Installation, Task 1 for equipment to be used.

Unpack MILES 113 APC transit case and VULCAN, Self-Propelled transit case. Verify that all equipment is present and not visibly damaged. Check VULCAN against illustrations in Appendix B, Components of End Item. Refer to TM 9-1265-370-10-3 for MILES M113 APC.

Obtain all Support Equipment (Appendix C), and Expendable/Durable Supplies and Materials (Appendix D).

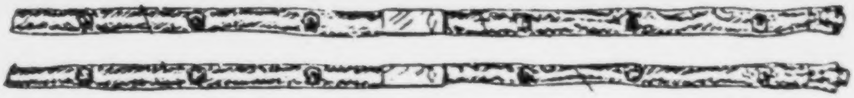
OUTSIDE INSTALLATION TASKS - LIST

Task	Title	Page
1.	Obtain Equipment	2-12
2.	Clean and Prime Vehicle	2-15
3.	Install Fastener Tape	2-16
4.	Inspect Fastener Tape	2-20
5.	Inspect and Service Detector Belt Segments	2-21
6.	Install Right Side Detector Belt	2-22
7.	Install Left Side Detector Belt	2-23
8.	Install Front Detector Belt	2-24
9.	Install Rear Detector Belt	2-25
10.	Inspect CVKI and Adapter Plate	2-26
11.	Install CVKI	2-27
12.	Inspect FLASHWESS	2-28
13.	Install FLASHWESS	2-29
14.	Inspect VULCAN Laser Transmitter/Modulator	2-30
15.	Install VULCAN Laser Transmitter/Modulator	2-31
15.1.	Install VULCAN Laser Transmitter/Modulator (with updated boresight telescope mounting bracket)	2-31.1
16.	Inspect Interface Control Assembly (ICA)	2-34
17.	Install Interface Control Assembly (ICA)	2-35
18.	Inspect Battery Box	2-36
19.	Install Battery Box	2-37

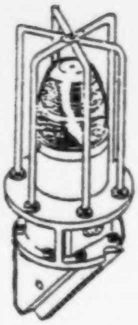
Outside Installation Task 1: Obtain Equipment. Completion of Outside Installation Tasks requires equipment listed and illustrated below. Equipment is supplied in either the MILES VULCAN, Self-Propelled, or the MILES M113 APC transit case. Locate and set aside this equipment.

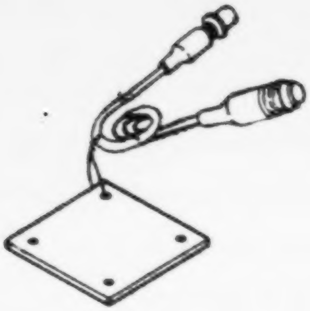
2 Detector Belt Segment Assemblies Number 2
(from MILES M113 APC transit case)

2 Detector Belt Segment Assemblies Number 1
(from MILES M113 APC transit case)



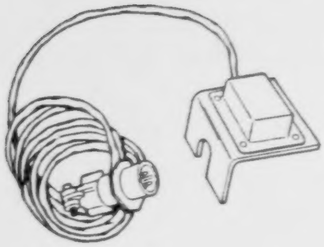
1 CVKI Assembly
(from MILES M113 APC transit case)
and 1 Adapter Plate with 4 bolts



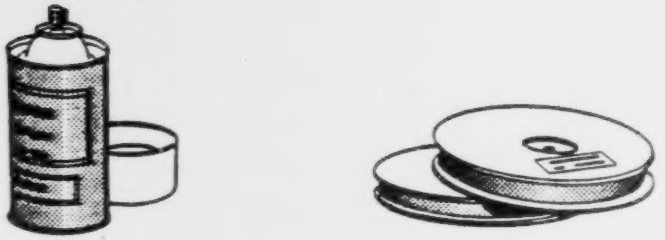


2 Protective Caps

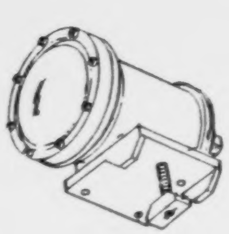
1 Microphone Assembly



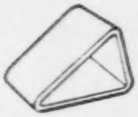
1 Installation Kit (1 can Primer and 1 roll Fastener Tape)



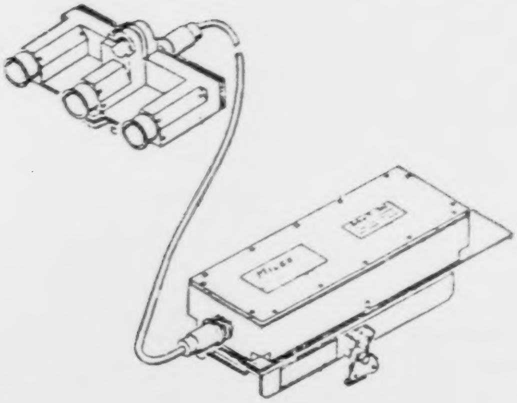
1 FLASHWESS



1 Wedge Block

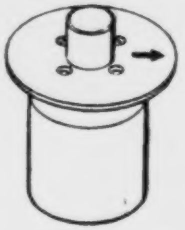


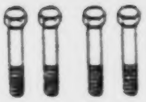
1 Laser Transmitter Assembly (includes modulator)



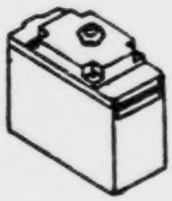
Outside Installation Task 1: Obtain Equipment (Cont).

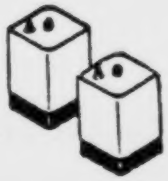
1 Transmitter Bottom Flange and 4 MILES screws



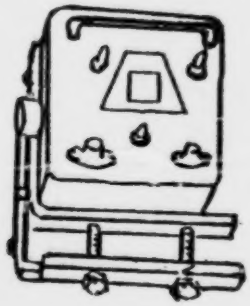


1 Battery Box (from either Vulcan or M113 APC transit case) and two 6 V batteries

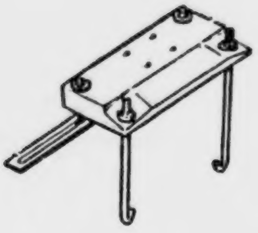




1 Interface Control Assembly (ICA)

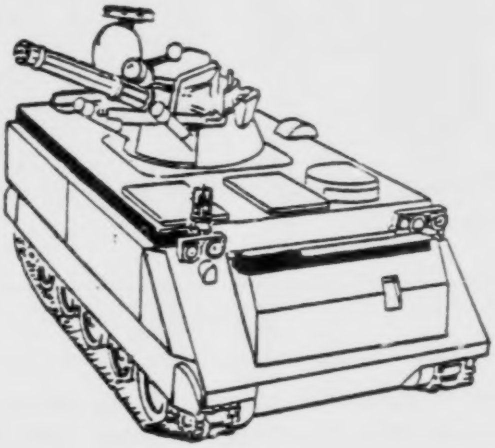


1 Transmitter Mount Assembly (Used on new antenna)



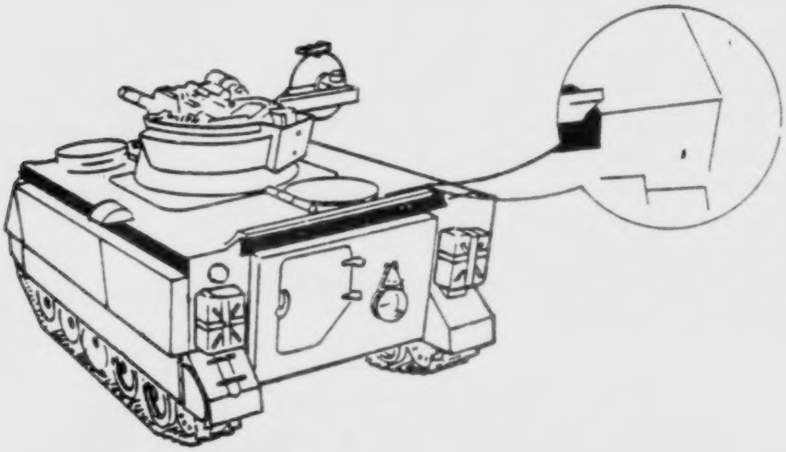
Outside Installation Task 2: Clean and Prime Vehicle. Hook fastener tape must be installed on the vehicle as a base for mounting detector belts and cable assemblies. IN ALL INSTANCES VEHICLE SURFACES MUST BE CLEANED AND PRIMED BEFORE APPLYING TAPE.

If vehicle is already equipped with fastener tape, go directly to Outside Task 4: Inspect Fastener Tape.



NOTE

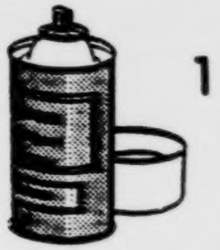
Tape will not stick to dirty or greasy surfaces. Clean areas marked on both sides, front, and above door in rear.

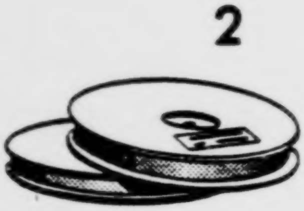


Clean areas where tape will be installed as shown by darkened areas in above diagrams. Use water, rags and brush (Items 6 and 7, Appendix D).

Outside Installation Task 2: Clean and Prime Vehicle (Cont).

An Installation Kit (Items 3 and 4, Appendix D), containing tape primer (1) and fastener tape (2) required to complete this task.





Before spraying tape primer, be sure you know where to mount the tape. Location of tape is illustrated i Outside Installation Task 3 steps.

WARNING

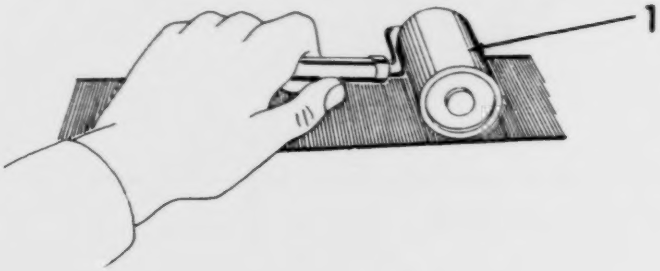
Primer is highly inflammable. Do not spray near Heat, Sparks, or Open Flame. No Smoking. Use only in well-ventilated area.

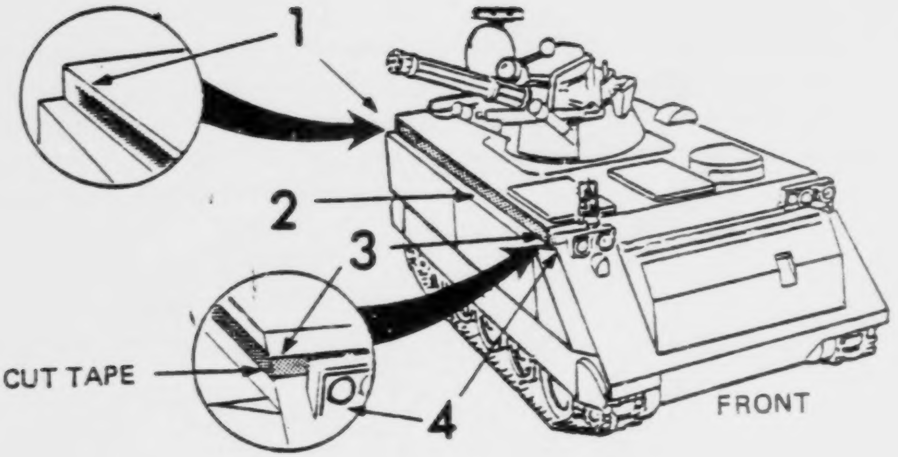
Spray a heavy coat of tape primer on cleaned areas of vehicle, one section at a time. Allow primer to dr 3 to 5 minutes before applying fastener tape.

Outside Installation Task 3: Install Fastener Tape.

The tape has a protective paper backing which must be removed before installing. For small lengths, th entire backing may be removed before installing tape. For long lengths of tape, however, it i recommended that the backing material be removed while the tape is being installed. This will prevent ac hesive on the back of the tape from accidentally sticking to itself. Apply tape smoothly, cutting tape at a corners, sharp contours, weld beads, screw heads and at any other point where tape may not adhere Additional spray primer may be added where necessary.

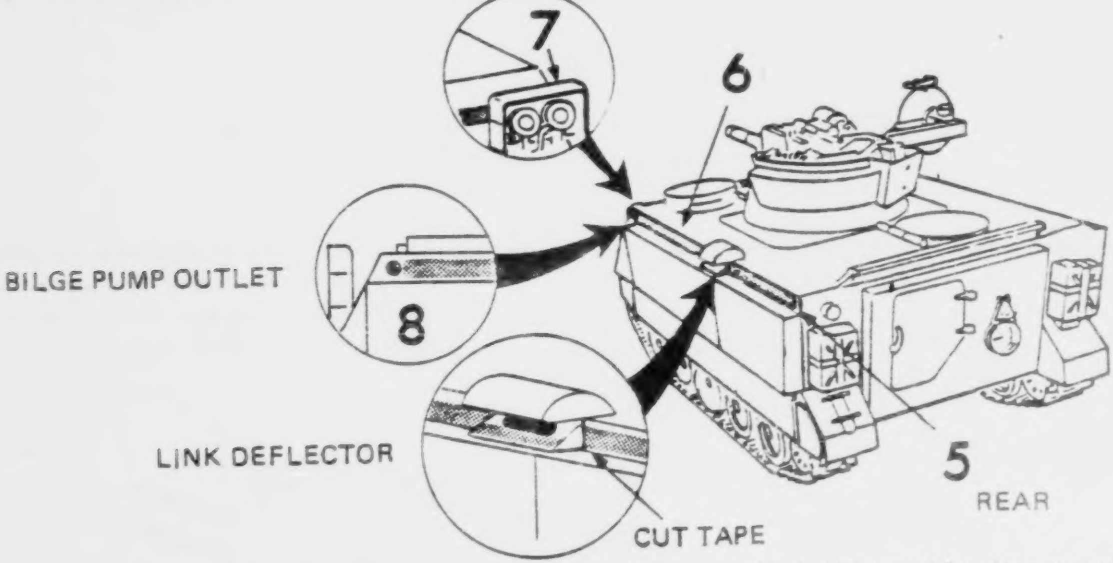
After tape is placed on primed areas, it must be pressed very hard with hand roller (1) (Item 4, Append C). Use roller as shown.





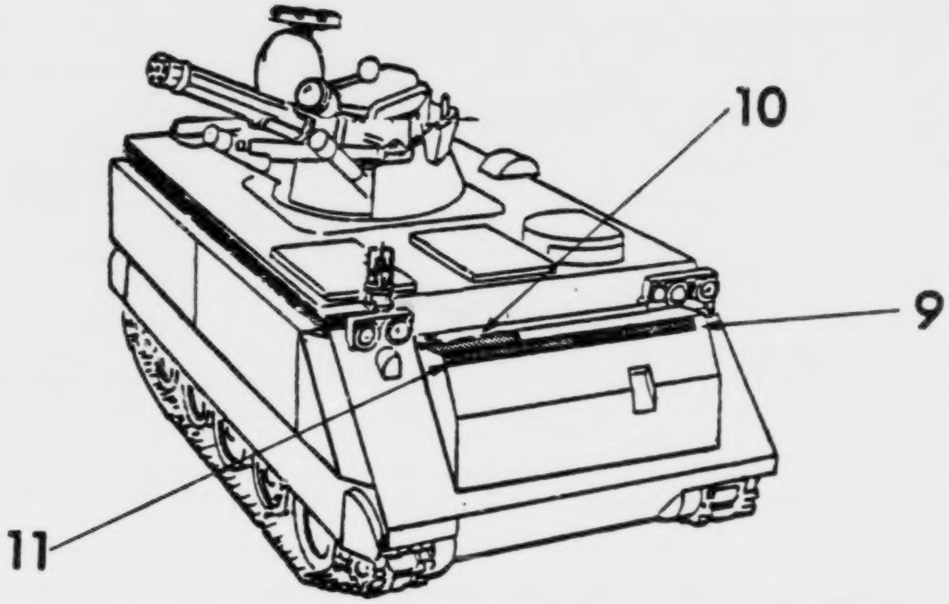
Stretch out a detector belt segment No. 1. Unroll and cut a strip of tape 6 inches longer than belt segment.

Begin installing tape on vehicle right side. Start approximately 5 inches from rear of vehicle (1). Press against primer. Continue towards front of vehicle (2). Continue applying tape around front of vehicle (3). Angle tape down behind headlamps and headlamp bracket (4). After tape is placed on primed areas press firmly with hand roller.



Cut a second tape strip 6 inches longer than detector belt segment No. 1. Start applying tape on vehicle left side approximately 5 inches from rear of vehicle (5). If vehicle has link deflector modification, cut tape on both sides of shield and install a 6-inch strip across shield face. If vehicle has not been modified, route tape straight across side and around front of vehicle (6). Angle tape down behind headlamps and headlamp bracket (7). Return to bilge pump outlet (8). Cut away tape to expose pump outlet. Press tape firmly with roller.

Outside Installation Task 3: Install Fastener Tape (Cont).

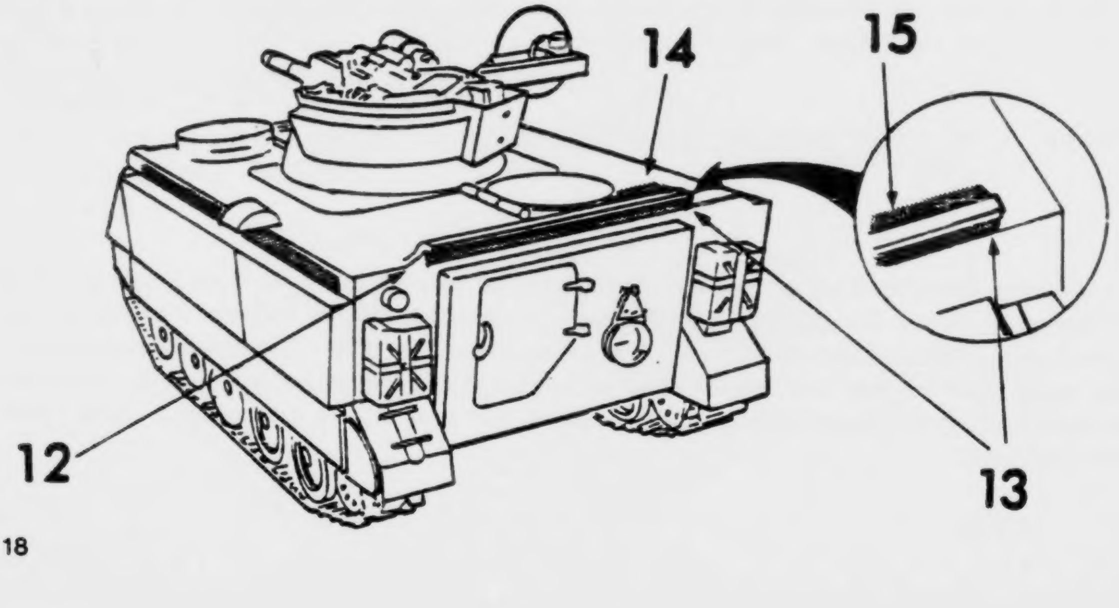


Stretch out a detector belt segment labeled No. 2. Cut a strip of tape 10 inches longer than belt segme
Install tape along top front edge of trim vane. Start applying tape about 3 inches from the left side of va
(9). Continue across top of vane until opposite edge (10) is reached. Cut and save excess tape.

NOTE

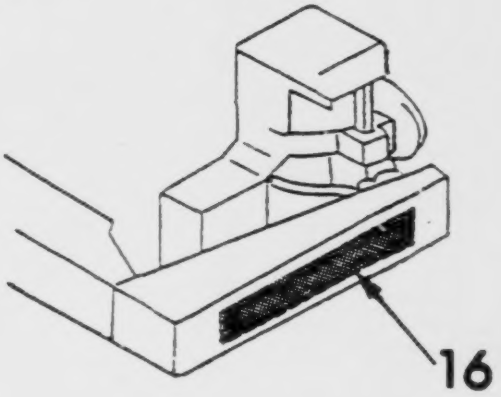
Ensure the following areas have been thoroughly cleaned and a heavy coat of primer has been applied prior to continuing.

Apply excess tape strip to top of trim vane. Start at right side of vane (11). Press tape firmly with rolle

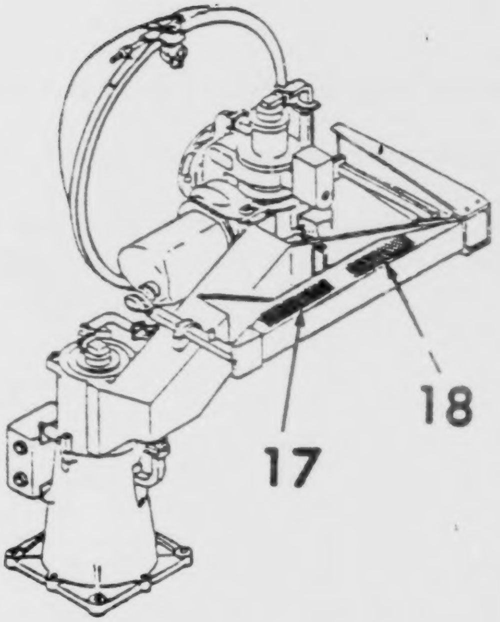


Cut a second tape strip the length of detector belt segment No. 2. Install tape above the swing down ramp at rear of vehicle. Start above swing down ramp left corner (12). Continue to right edge of ramp and cut tape at ramp corner bend (13). Excessive tape should be folded across top of ramp lip. Continue applying tape to top of vehicle (14). Tape must be flat against vehicle surface (15). Continue applying back towards left side. Press tape firmly with roller.

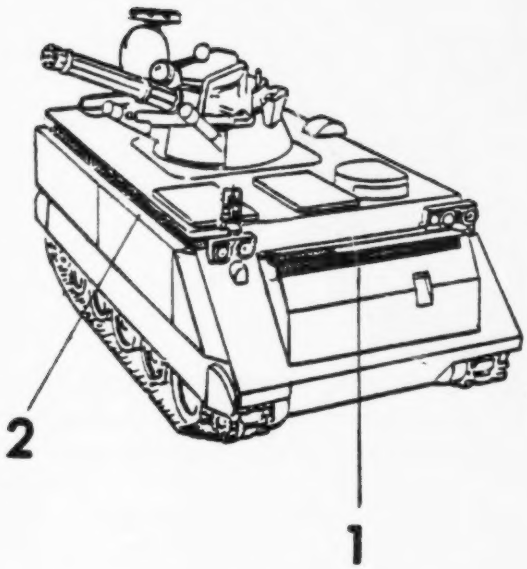
Install 14-inch tape strip (16) on exterior side of waveguide guard.

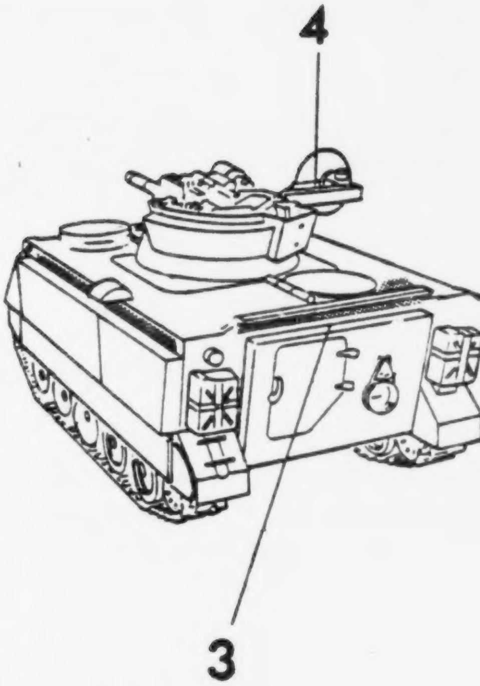


Install 24-inch strip of tape (17) on top surface of waveguide guard. If equipped with protective rubber cover use two 12-inch tape strips (18) as illustrated.



Outside Installation Task 4: Inspect Fastener Tape



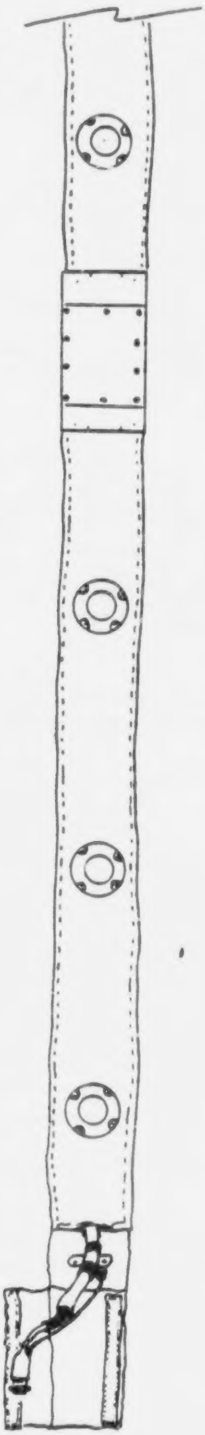


Check that fastener tape is mounted on front (1), right side (2), rear (3), and left side of vehicle.

Check that fastener tape is mounted on waveguard (4).

If any fastener tape is missing from turret, mount tape on places it belongs. Use instructions given fo Outside Installation Tasks 2 and 3 (pages 2-15 and 2-16).

Outside InstallationTask 5: Inspect and Service Detector Belt Segments. All four detector belt segments must be checked. They are supplied in the MILES M113 APC Simulator System.



Look for any damage that would prevent normal use of the belt segments (1).

Wipe detectors (2) clean. (Clean all detectors.)

Report any damage on DA Form 2404.

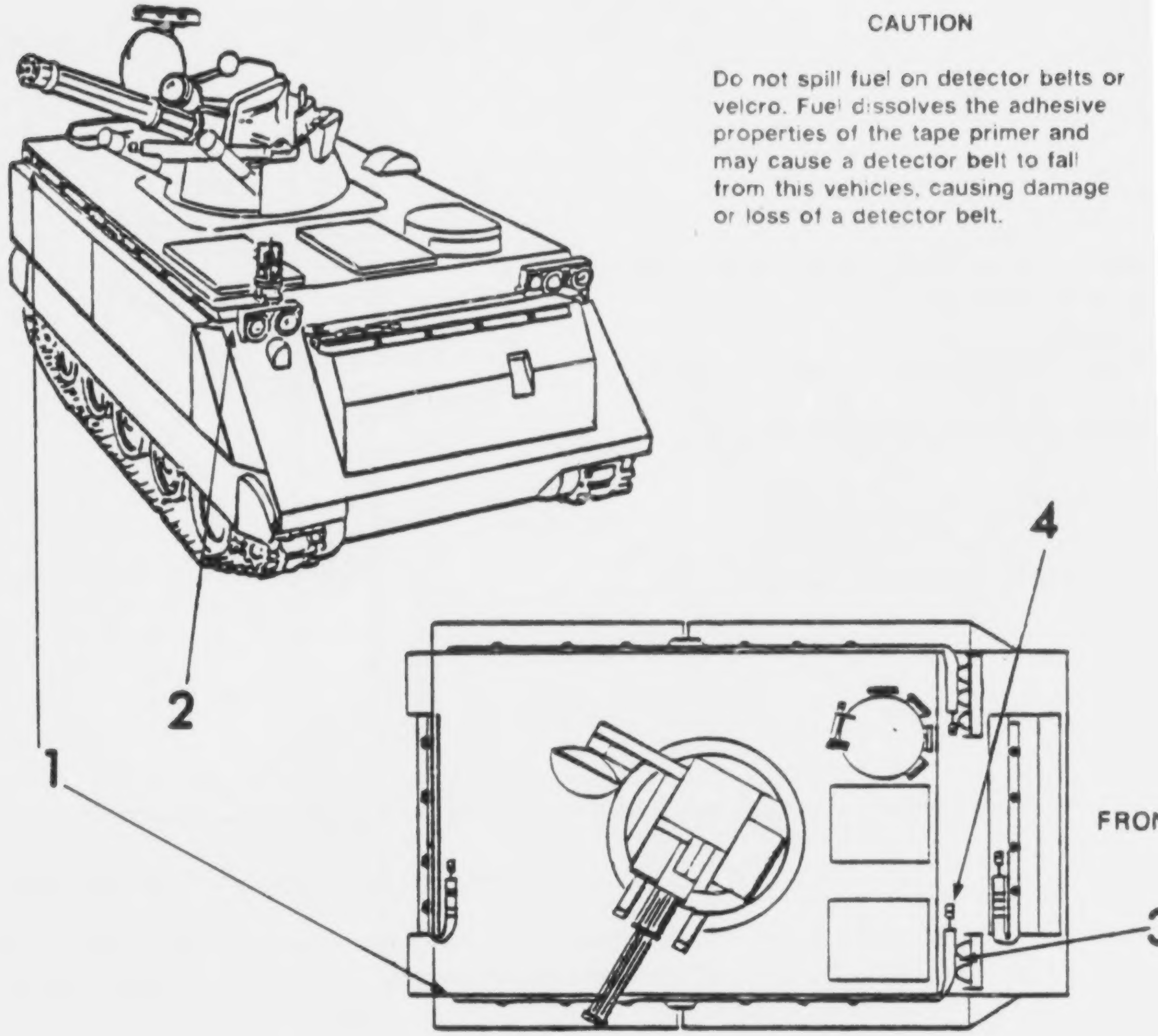
NOTE

Replace belt segments if damaged.

Outside Installation Task 6: Install Right Side Detector Belt.

CAUTION

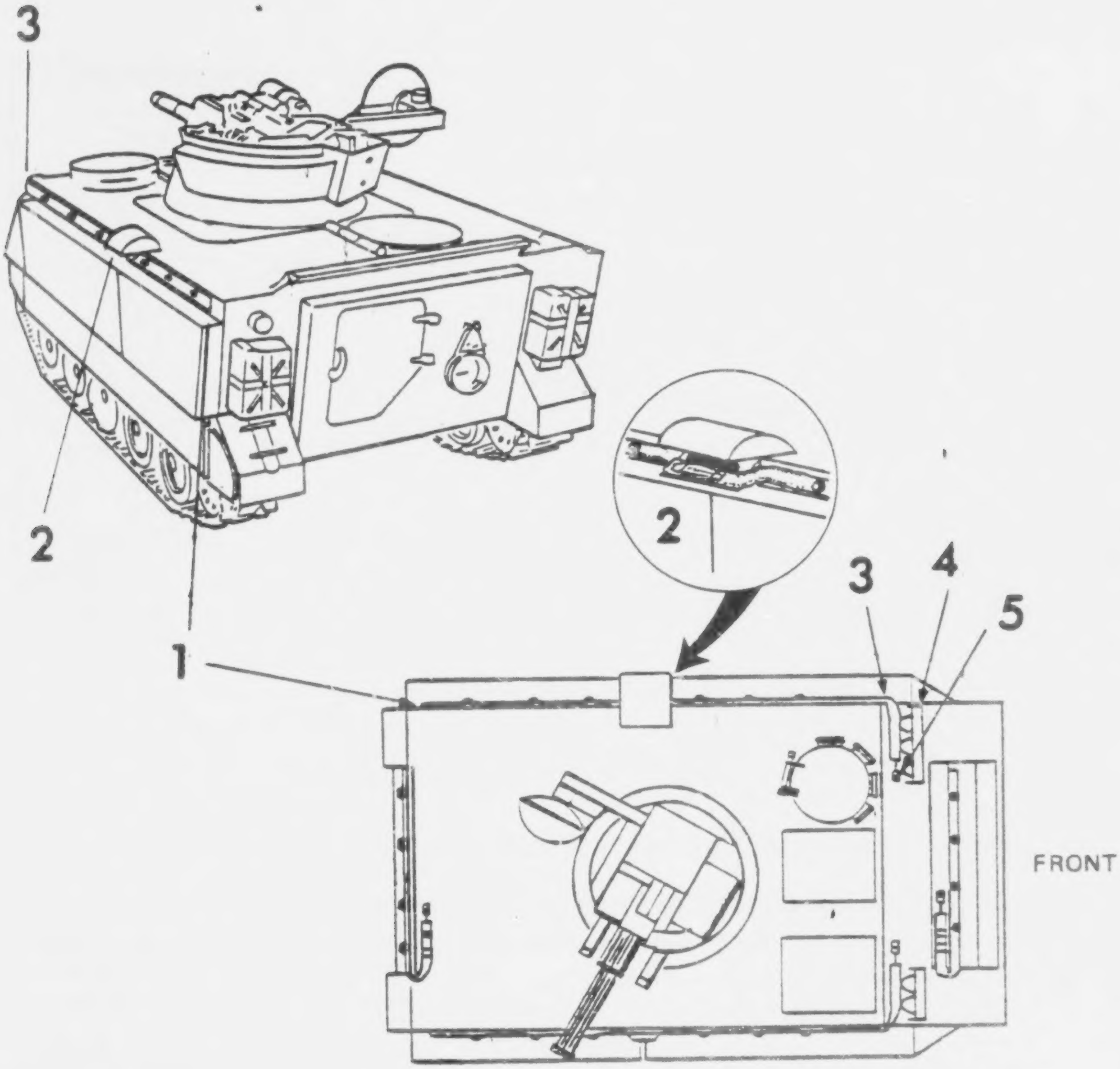
Do not spill fuel on detector belts or velcro. Fuel dissolves the adhesive properties of the tape primer and may cause a detector belt to fall from this vehicles, causing damage or loss of a detector belt.



Locate detector belt segment labeled No. 1. Arrange belt so that connector end is on your right.

Position belt on fastener tape approximately 5 inches from rear of vehicle (1). Work to your right, pressing belt against tape. Continue around vehicle corner (2) and behind head lamps (3). Press connector (4) against tape.

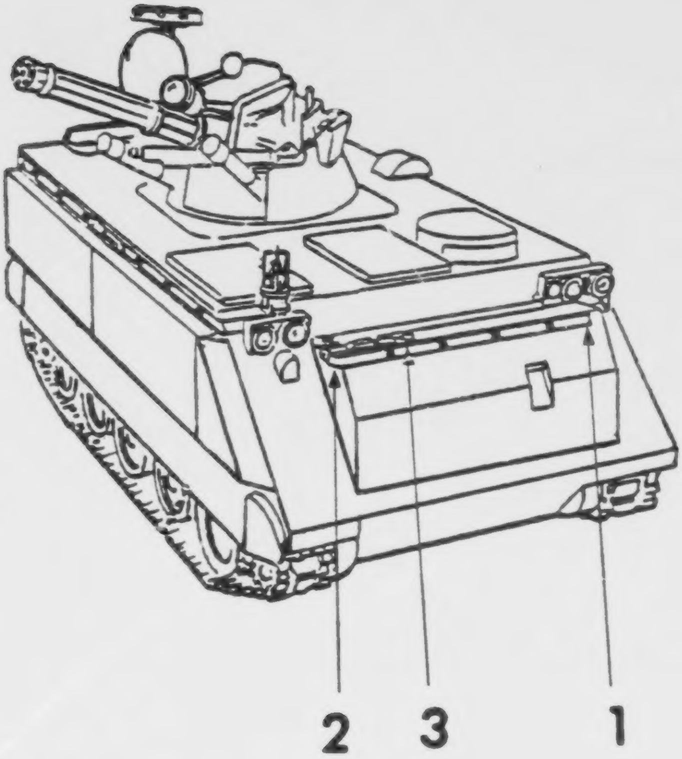
Outside Installation Task 7: Install Left Side Detector Belt.

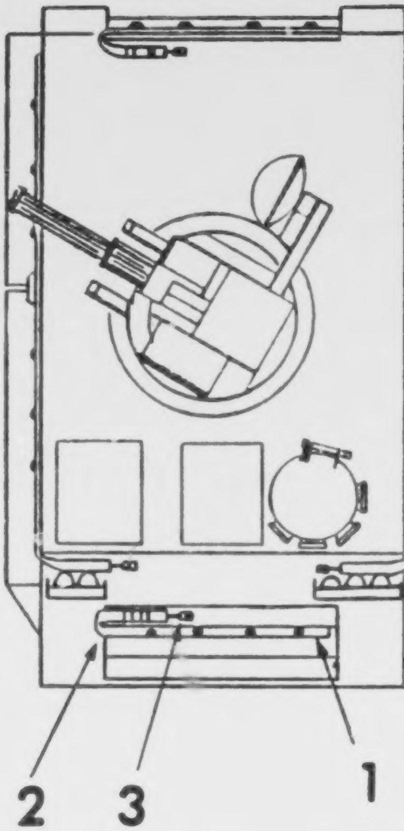


Locate second detector belt segment labeled No. 1. Arrange belt so that connector end is on your left.

Position belt on fastener tape approximately 5 inches from rear of vehicle (1). Work to your left, pressing belt against tape. Install wedge block (2), if required, (RED SIDE UP) under link deflector shield and position belt on block (2). Continue around vehicle corner (3) and behind head lamps (4). Press connector (5) against tape.

Outside Installation Task 8: Install Front Detector Belt.





Locate detector belt segment labeled **No. 2**. Arrange belt so that connector end is on your left.

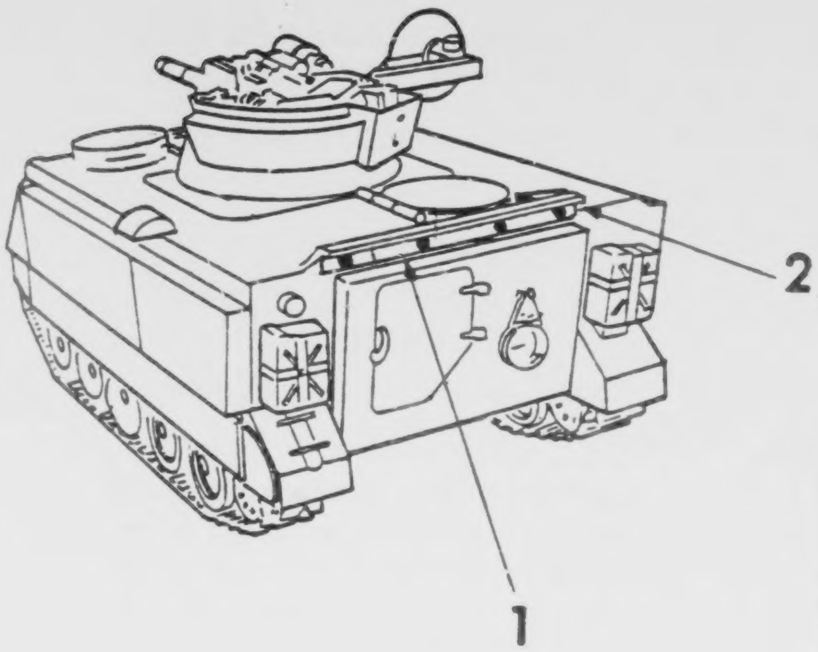
Start at belt segment end opposite connector. Position against tape at left edge (1) of trim vane. Work
your left. Bend belt segment upwards and back at trim vane right edge (2). Press remainder of belt
connector against tape at top of trim vane (3).

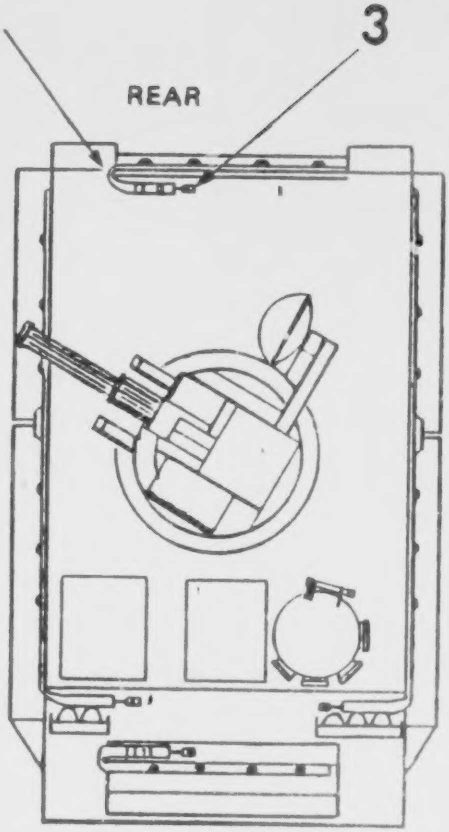
CAUTION

Front belt must be removed for access to engine compartment.

Before lowering trim vane, disconnect and remove detector belt from front to protect belt. Reinstall belt after trim vane is in raised position.

Outside Installation Task 9: Install Rear Detector Belt.





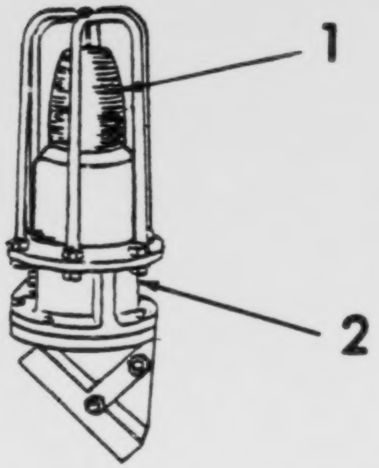
CAUTION

Insure detector belt is placed on fastener tape with enough clearance to allow closing of the ramp door. Failure to comply may cause damage to detector belt and/or ramp door.

Locate second detector belt segment labeled No. 2. Arrange belt so that connector end is on your right.

Start at belt segment end opposite connector. Position against tape above left corner at swing down ramp and align the bottom of the belt segment with the lower edge of the ramp lip (1) so ramp door will clear belt segment. Work to your right. Bend belt segment upwards and back across top of vehicle (2). Press remainder of belt and connector against tape on top of vehicle (3).

Outside Installation Task 10: Inspect CVKI and Adapter Plate.



NOTE

CVKI assembly is included in the MILES equipment for the M113 APC.

Inspect CVKI assembly (2) for any damage that would affect proper installation or operation.

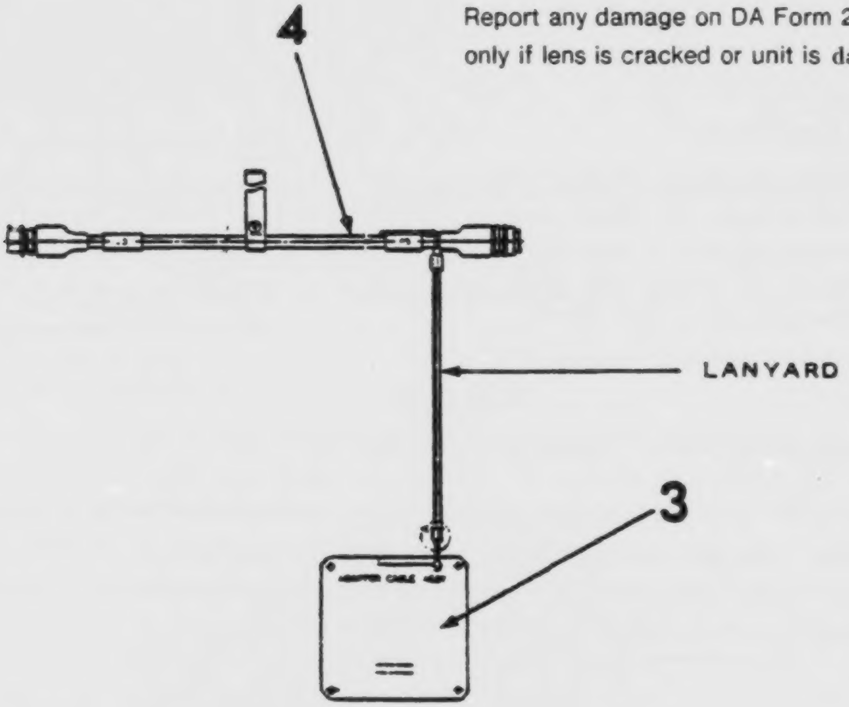
Inspect yellow lens (1) for cracks.

NOTE

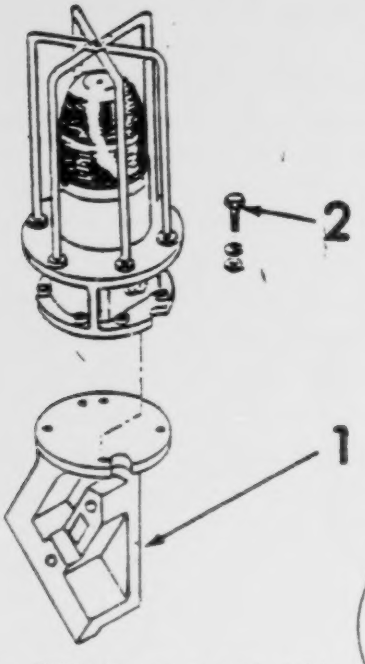
Adapter plate and CVKI cable are included in the MILES Vulcan Kit.

Inspect Adapter Plate (3) for any damage that would affect proper installation. Check that CVKI adapter cable (4) is secured to bracket by a lanyard. Inspect adapter cable for damaged connectors.

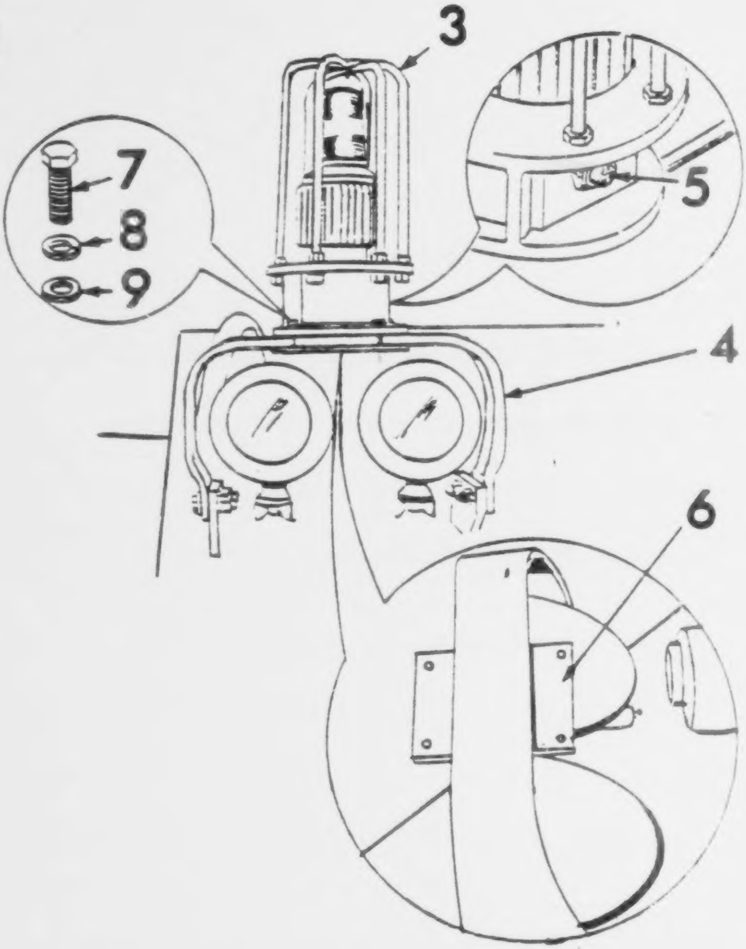
Report any damage on DA Form 2404. Replace only if lens is cracked or unit is damaged.



Outside Installation Task 11: Install CVKI.



Remove adapter (1), bolts (2), and washers from MILES M113 APC CVKI assembly. Use adjustable wrench. Return items removed to transit case.

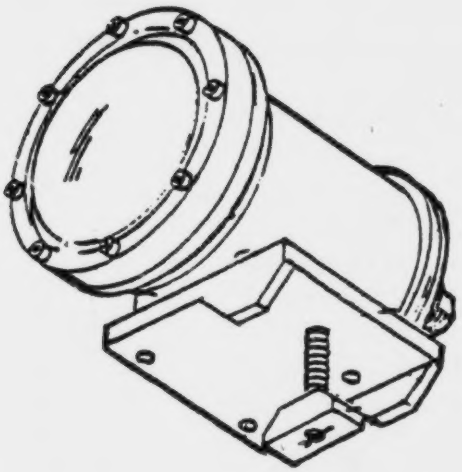


Position CVKI (3) on top of right front headlight guard (4) with CVKI connector (5) facing toward rear.

Place adapter plate (6) under guard. Line up adapter plate bolt holes with holes in CVKI base.

Remove four bolts (7), lock washers (8), and flat washers (9), located in MILES VULCAN Kit and secure CVKI to guard with adapter plate.

Outside Installation Task 12: Inspect FLASHWESS.



Inspect FLASHWESS for any visible damage that would prevent operation or installation.

Check that lens has no cracks and all bolts are tight.

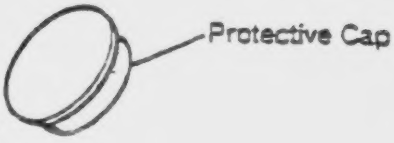
Report any damage on DA Form 2404.

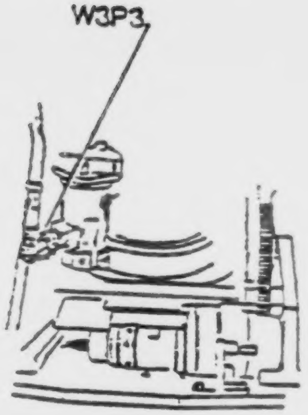
Replace FLASHWESS if damaged.

Outside Installation Task 13: Install FLASHWESS.

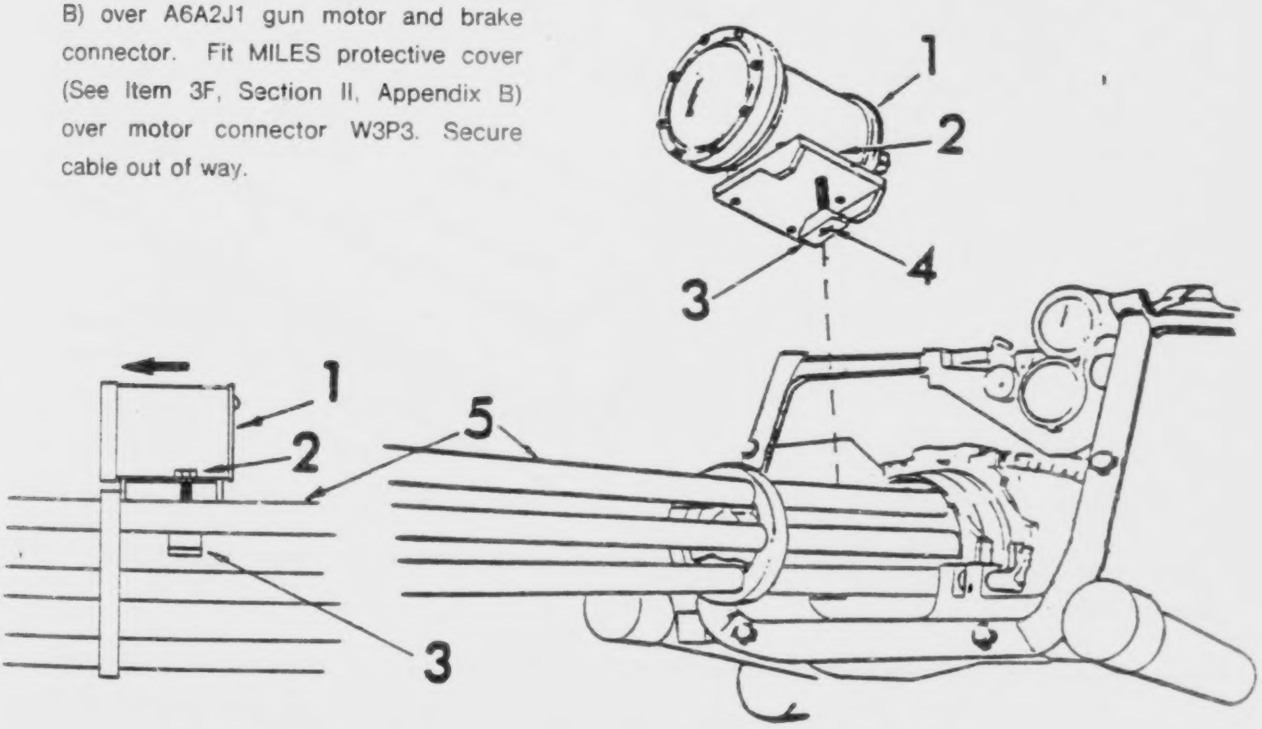
WARNING

Failure to disconnect motor connector W3P3 can cause damage to equipment and/or injury to personnel.





Disconnect VULCAN cannon motor connector W3P3. Fit MILES protective cover (see Item 3E, Section II, Appendix B) over A6A2J1 gun motor and brake connector. Fit MILES protective cover (See Item 3F, Section II, Appendix B) over motor connector W3P3. Secure cable out of way.

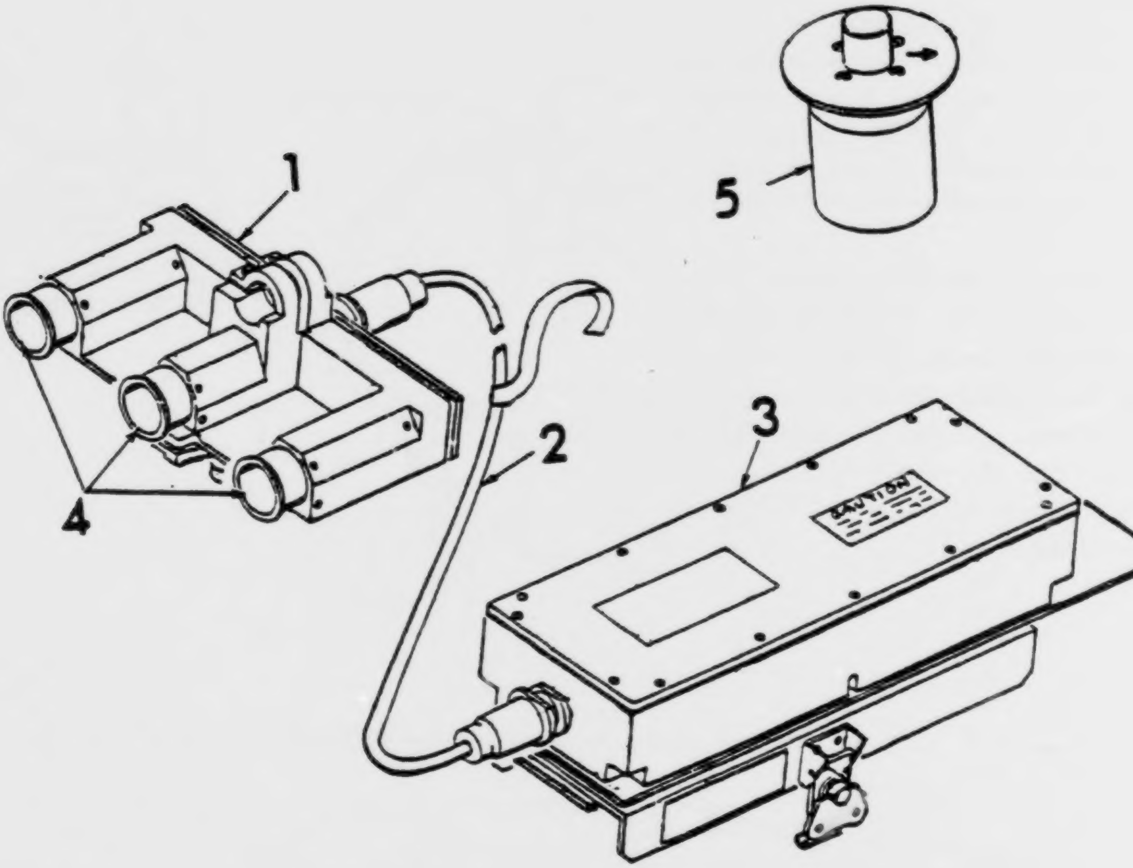


Loosen wedge (3) until it touches cotter pin (4). Turn wedge to fit between top two cannon barrels (5).

Position FLASHWESS (1) on top rear of two barrels with connector toward rear and body behind mid-barrel clamp. Insert wedge between barrels.

Slide FLASHWESS forward until it is aligned with barrel clamps. Turn longer side of wedge perpendicular to barrels. Tighten bolt (2) using adjustable wrench.

Outside Installation Task 14: Inspect VULCAN Laser Transmitter/Modulator.



Inspect transmitter (1), cable (2) and modulator (3) for any damage that would prevent installation or normal operation.

Remove any dirt or oil from lenses (4) with lens paper or a soft dry cloth.

Inspect transmitter bottom flange (5) for any damage that would prevent normal installation.

Report any damage on DA Form 2404. Replace transmitter, flange or modulator if damaged.

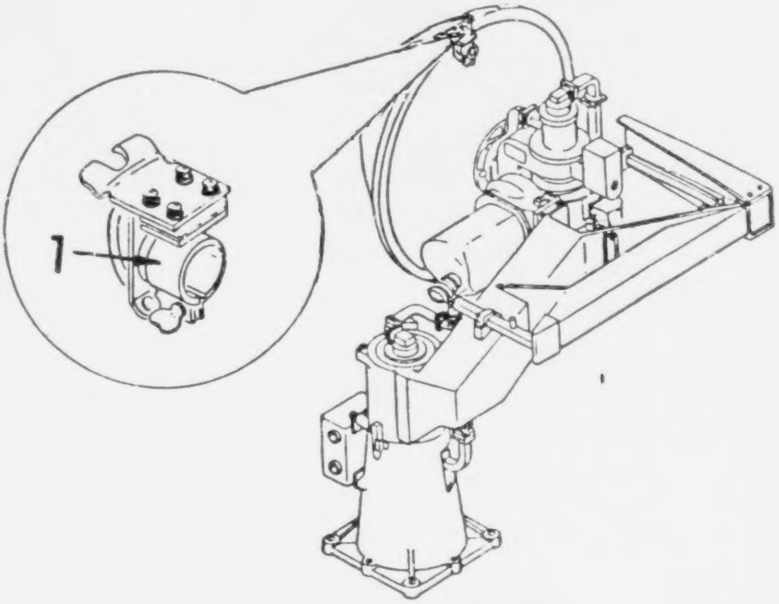
Outside Installation Task 15: Install VULCAN Laser Transmitter/Modulator.

OMIT THIS TASK IF UPDATED BORESIGHT TELESCOPE MOUNTING BRACKET (without four Allen screws) IS USED.

NOTE

Save screws, they will be used to replace clamp after the transmitter adapter set is removed.

Using Allen wrench from boresight kit, remove four screws securing boresight telescope mounting clamp, (1). Remove clamp.

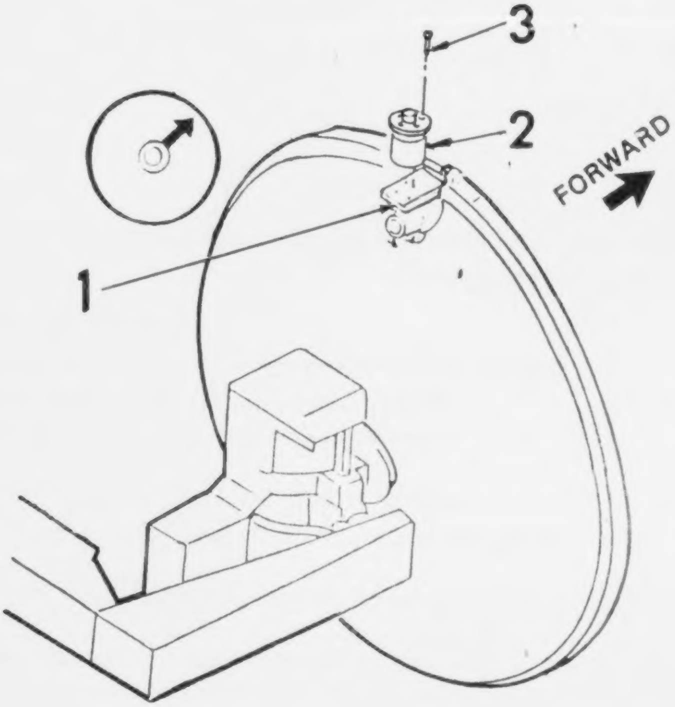


NOTE

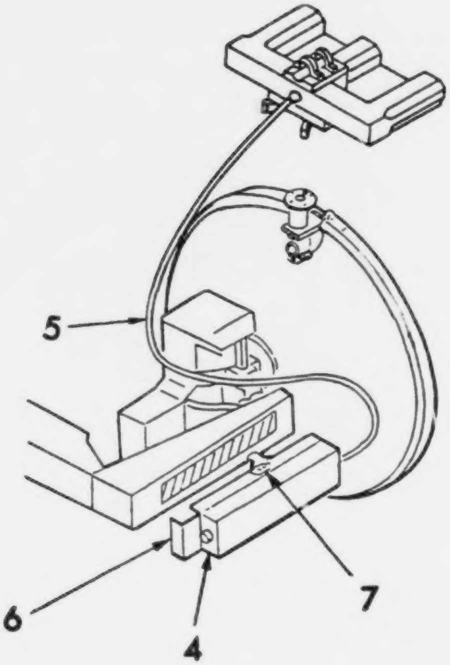
Be sure arrow on flange is on top and pointing forward.

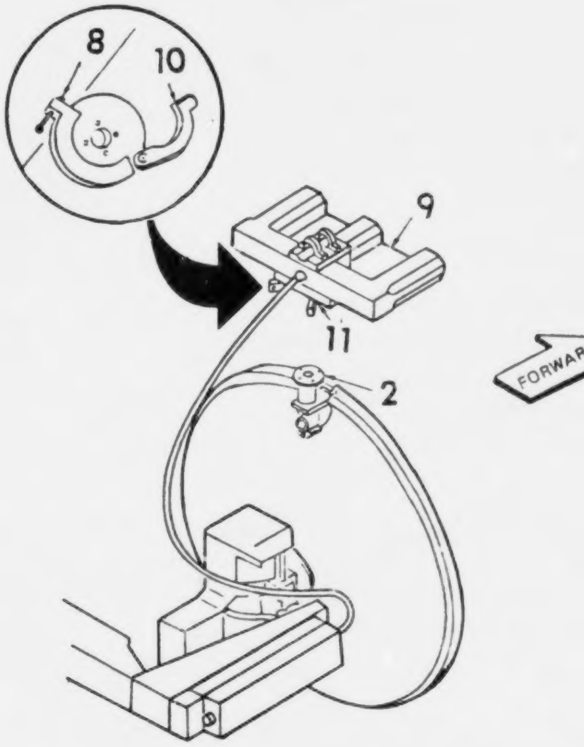
Reinstall telescope mounting clamp (1).

Install MILES transmitter bottom flange. Secure telescope mounting clamp (1) and bottom flange (2) with four MILES supplied 2-inch long socket head cap screws (3) (see Item 31, Section II, Appendix B).



Outside Installation Task 15: Install VULCAN Laser Transmitter/Modulator (Cont).





Position modulator (4), with cable (5) toward antenna, on waveguide guard. Align modulator guide with end of waveguide guard.

CAUTION

Be sure locking clamps are properly seated on waveguide.

Install modulator by meshing fastener tape on modulator firmly into fastener tape you installed. Sec modulator to waveguide guard with two locking clamps (7).

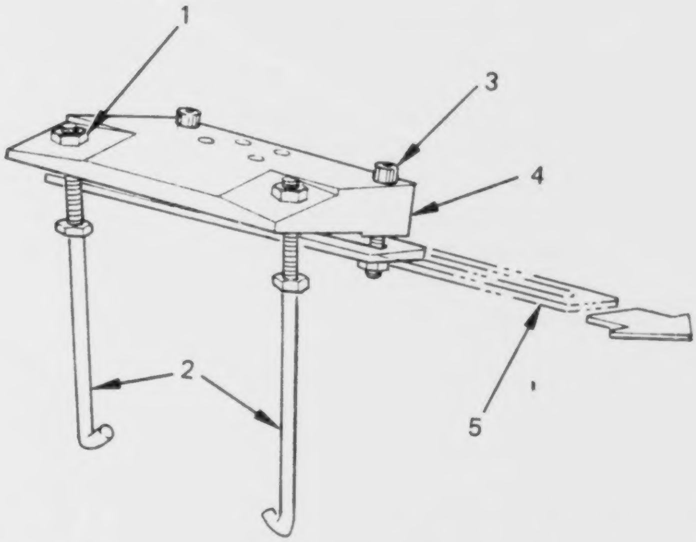
Loosen clamp retainer screw (8) on transmitter (9). Open clamp (10).

Position mounting base (11) on bottom flange (2). Tighten retainer screw just enough to hold transmi on mount. (Tighten screw securely only after completing Alignment Tasks, page 2-62).

Outside Installation Task 15.1: Install VULCAN Laser Transmitter/Modulator.

OMIT THIS TASK IF ORIGINAL BORESIGHT TELESCOPE MOUNTING BRACKET (with four Allen screws) IS USED.

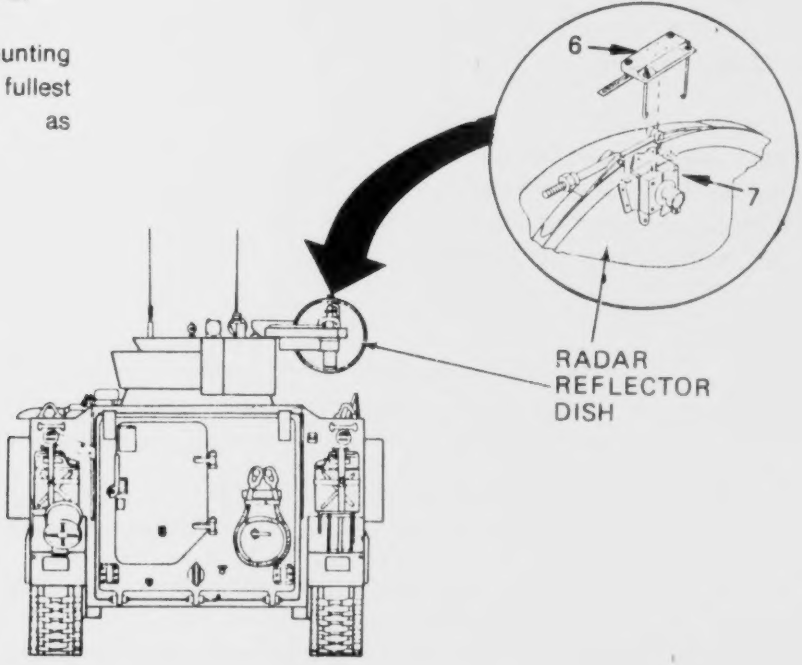
Loosen upper nut (1) on each of two "J" hooks (2) and run both nuts up thread as far as they will go. (Each "J" hook thread has been purposely deformed at the end to prevent removal of nut and washer.)



Loosen both socket head screws (3) securing mounting plate (4) to mounting bracket (5). (Socket head screws have been purposely deformed at the ends to prevent removal of nut and washers.)

Install transmitter mount assembly (6) onto boresight telescope mounting bracket (7) as follows:

- Slide slotted mounting bracket (5) to its fullest extended position, as shown.



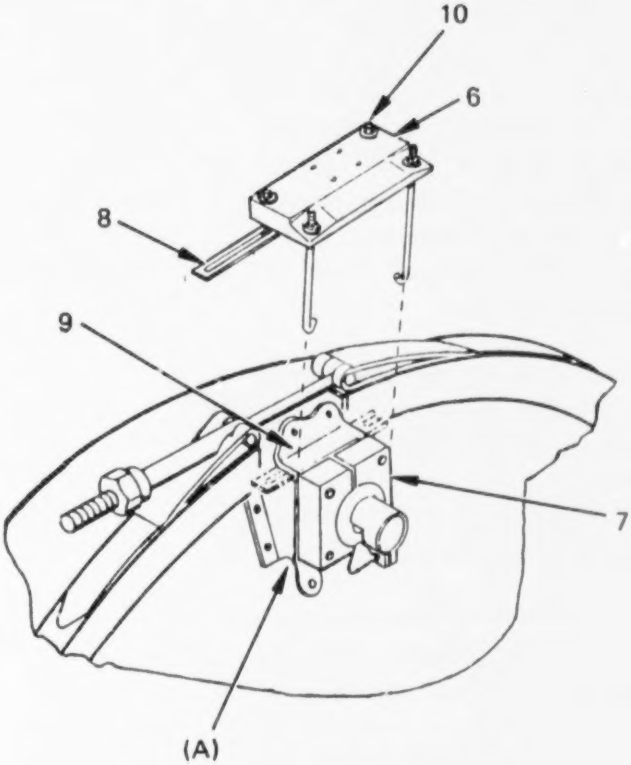
Outside Installation Task 15.1: Install VULCAN Laser Transmitter/Modulator (Cont).

- Place transmitter mounting assembly (6) onto the boresight telescope mounting bracket (7).

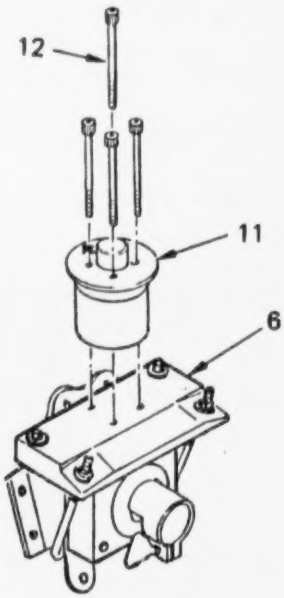
- Slide the extended transmitter mount bracket (5) under the boresight telescope mounting bracket clamp (9) until the open slot at end of bracket engages detached socket head screw (10).

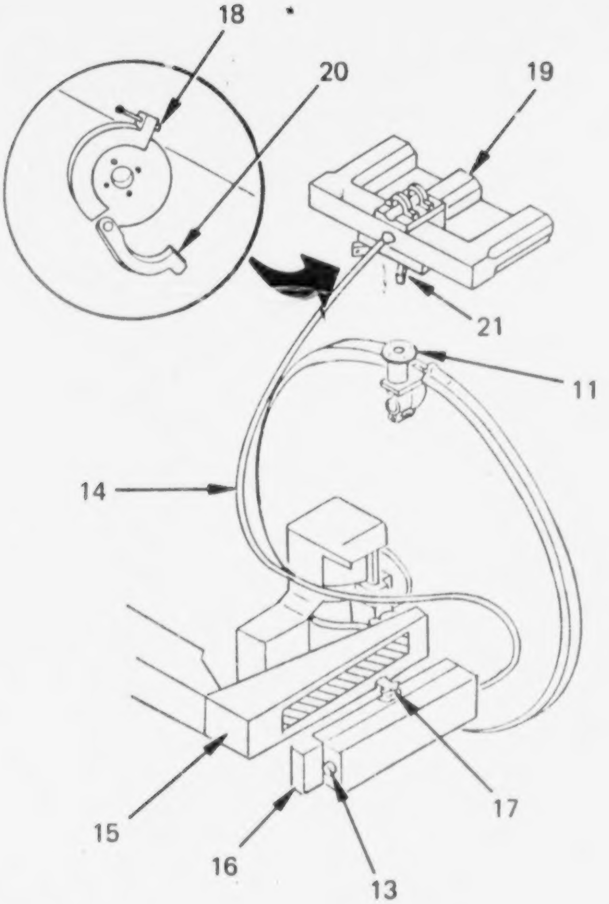
- Tighten both socket head cap screws and torque 35 to 40 inch-pounds.

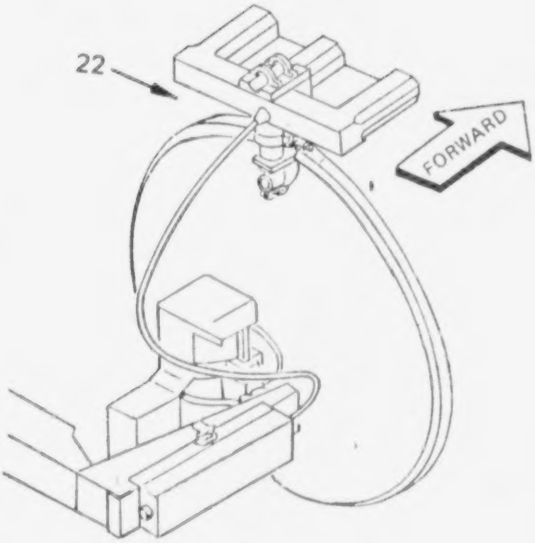
- Fasten ends of "J" hooks underneath each side of boresight telescope mounting bracket (A) and tighten "J" hook nuts. Torque nuts 30 to 35 inch-pounds.



Install bottom flange (11) onto transmitter mount assembly (6) so that arrow on top of flange is pointing forward. Secure with four MILES two-inch long socket head cap screws (12).







Position modulator (13), with cable (14) toward antenna, on waveguide guard (15). Align modulator guide (16) with end of waveguide guard.

CAUTION

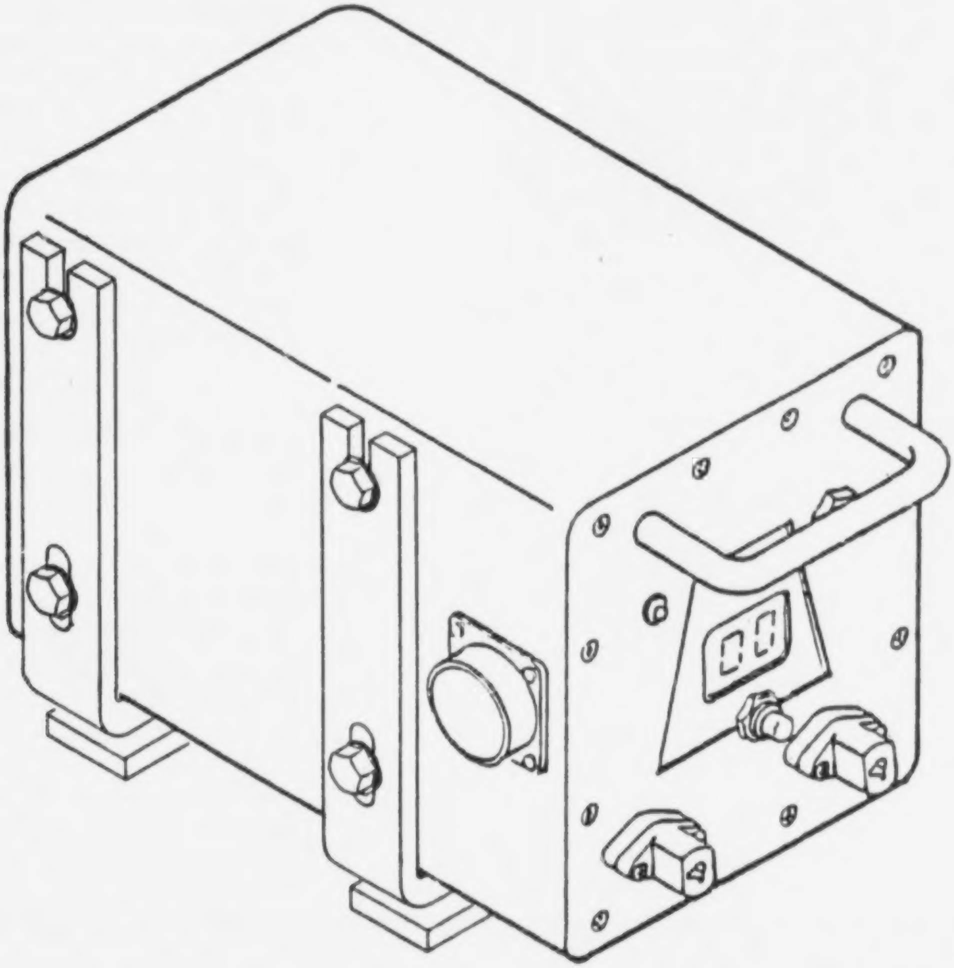
Be sure locking clamps are properly seated on waveguide.

Install modulator by meshing fastener tape on modulator firmly into fastener tape installed on waveguide guard. Secure modulator to waveguide guard with two locking clamps (17).

Loosen clamp retainer screw (18) on transmitter (19). Open clamp (20).

Position mounting base (21) on bottom flange (11). Tighten retainer screw just enough to hold transmitter on mount (22). (Tighten screw securely only after completing Alignment Tasks, page 2-62).

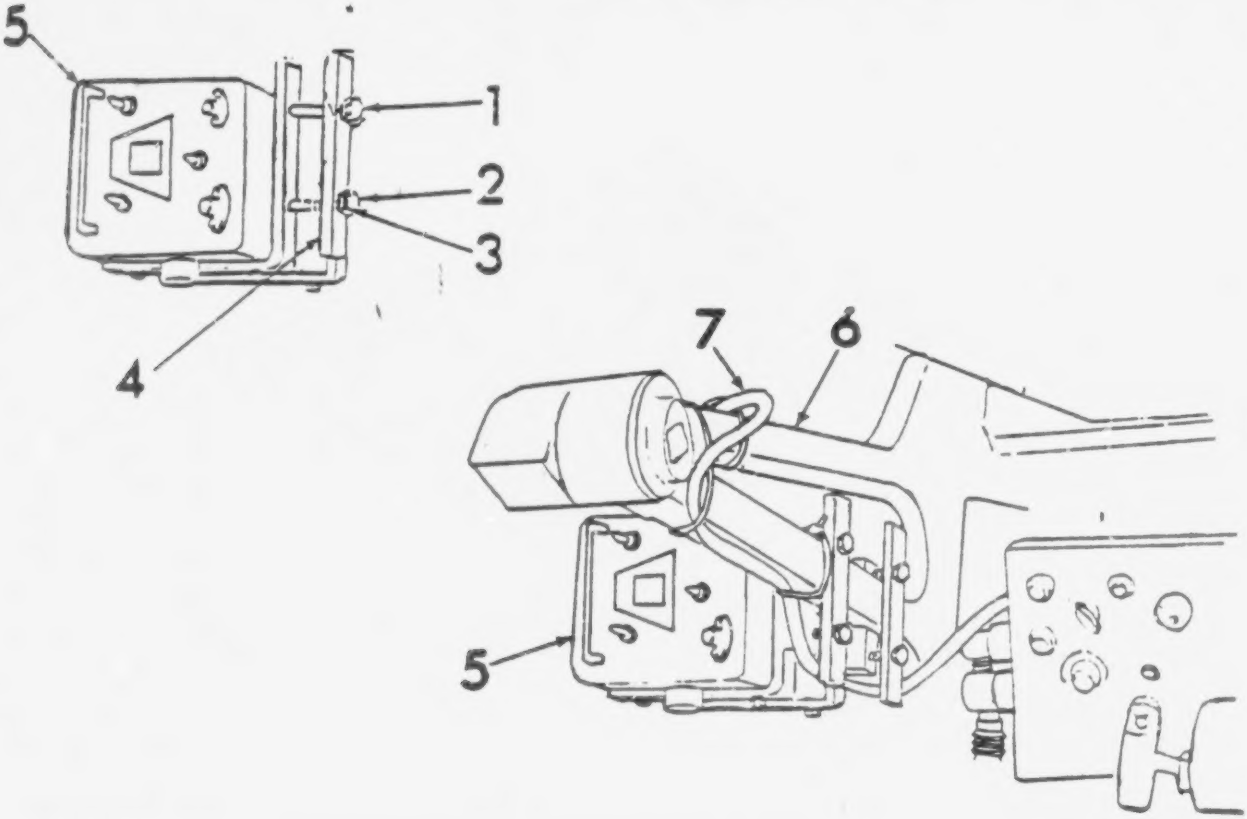
Outside Installation Task 16: Inspect Interface Control Assembly (ICA).



Inspect Interface Control Assembly for any damage that would prevent normal operation.

Report any damage on DA Form 2404. Replace assembly if damaged.

Outside Installation Task 17: Install Interface Control Assembly (ICA).



WARNING

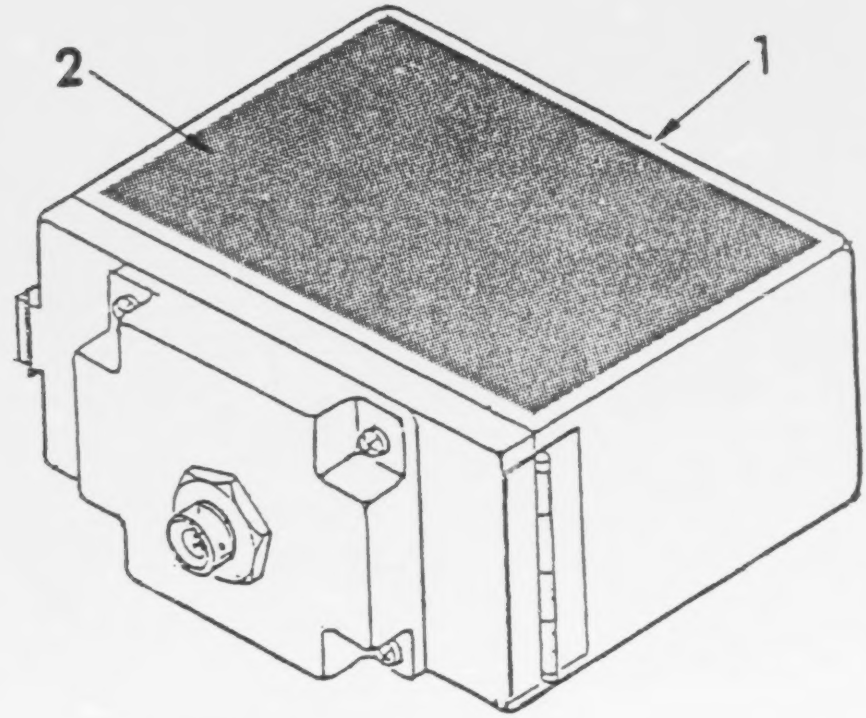
The Gunner must exercise caution when entering or leaving the Gunner's compartment to prevent possible injury to left leg/knee from the ICA mounting bolts.

Remove bolts (1), lock washers (2), flat washers (3), and both bars (4) from ICA adapter assembly.

Position ICA (5) on left lower side of 20 mm cannon elevation pivot arm (6) as close as possible to control panel.

Secure ICA to pivot arm with bar, washers, and bolts. Make sure installation does not pinch or interfere with night sight cable (7).

Outside Installation Task 18: Inspect Battery Box.



NOTE

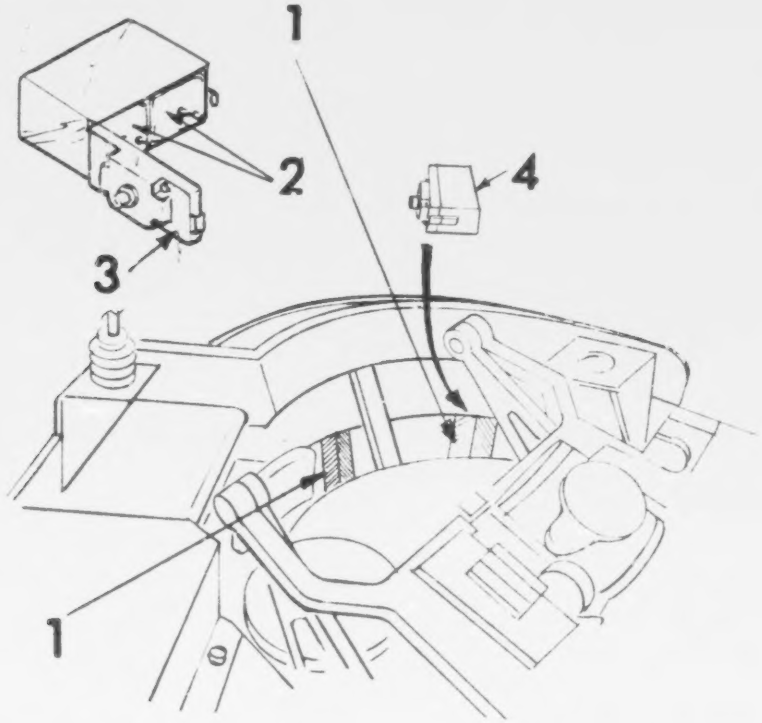
Two battery boxes are required. One is supplied with the MILES VULCAN, Self-Propelled, system. One must be obtained from the MILES M113 APC system. Either one may be used to complete this task.

Inspect battery box (1) for damage that would prevent normal operation.

Make sure pile fastener tape (2) is attached to one side of battery box. If tape is missing, do not atte to install new tape. Turn battery box in.

Report any damage on DA Form 2404. Replace if damaged.

Outside Installation Task 19: Install Battery Box.



Clean an area approximately 3 inches by 5 inches on inside turret left-hand surface. Several locations (1) are acceptable.

WARNING

Primer is highly inflammable. Do not spray near Heat, Sparks, or Open Flame. No Smoking. Use only in well-ventilated area.

Apply primer (see Item 3, Appendix D) to clean area at (1). Allow primer to dry for 3 to 5 minutes before applying fastener tape.

Cut two 6-inch strips of fastener tape and remove paper backing, (see Item 4, Appendix D). Install tape on primed and dried (tacky) surface using a hand roller (see Item 4, Appendix C). Roll firmly to insure a smooth surface.

Insert two 6 V batteries (2) (see Item 1, Appendix D) in battery Box (4).

Close and latch battery box cover (3).

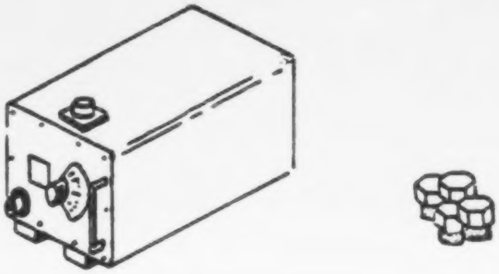
Install battery box (4) by meshing pile fastener tape on battery box firmly into fastener tape you installed.

INSIDE INSTALLATION TASKS - LIST

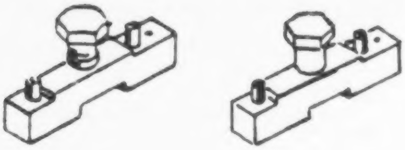
Task	Title	Page
1.	Obtain Equipment	2-38
2.	Inspect Battery Box	2-39
3.	Install Inside Battery Box	2-40
4.	Inspect Control Indicator Assembly	2-41
5.	Install Control Indicator Assembly	2-42

Inside Installation Task 1: Obtain Equiment. The following equipment is required to complete Inside Installation Tasks. Locate and set aside this equipment.

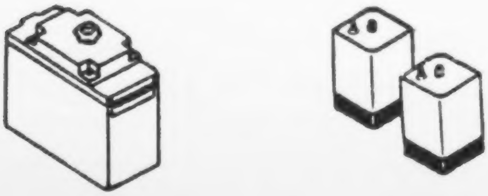
1 Control Indicator Assembly (from MILES M113 APC Transit Case) and 4 MILES cap screws



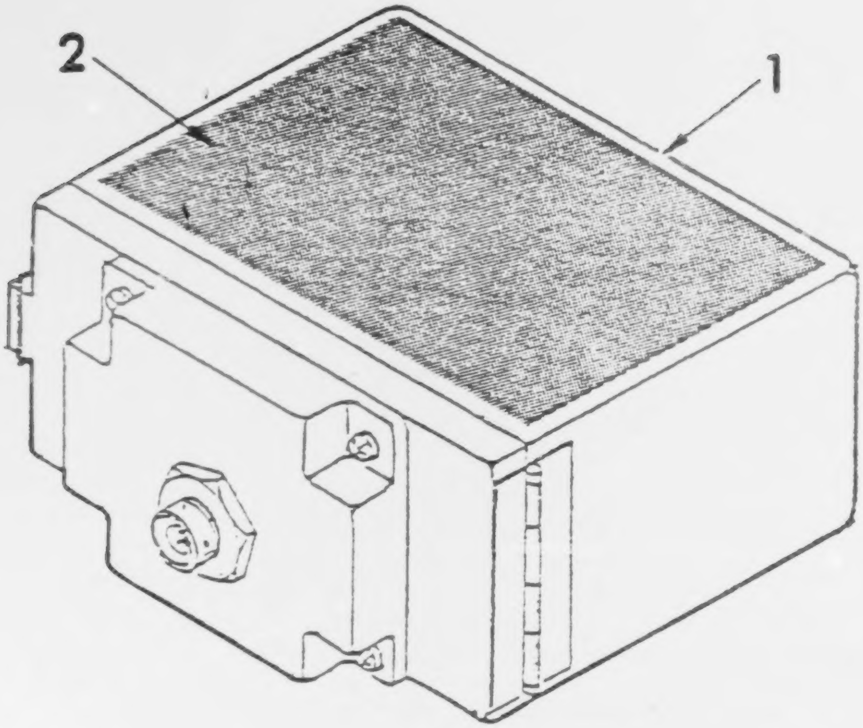
2 Universal Adapter Assemblies



1 Battery Box, (from MILES M113 APC Transit Case) and two 6 V batteries



Inside Installation Task 2: Inspect Battery Box.



NOTE

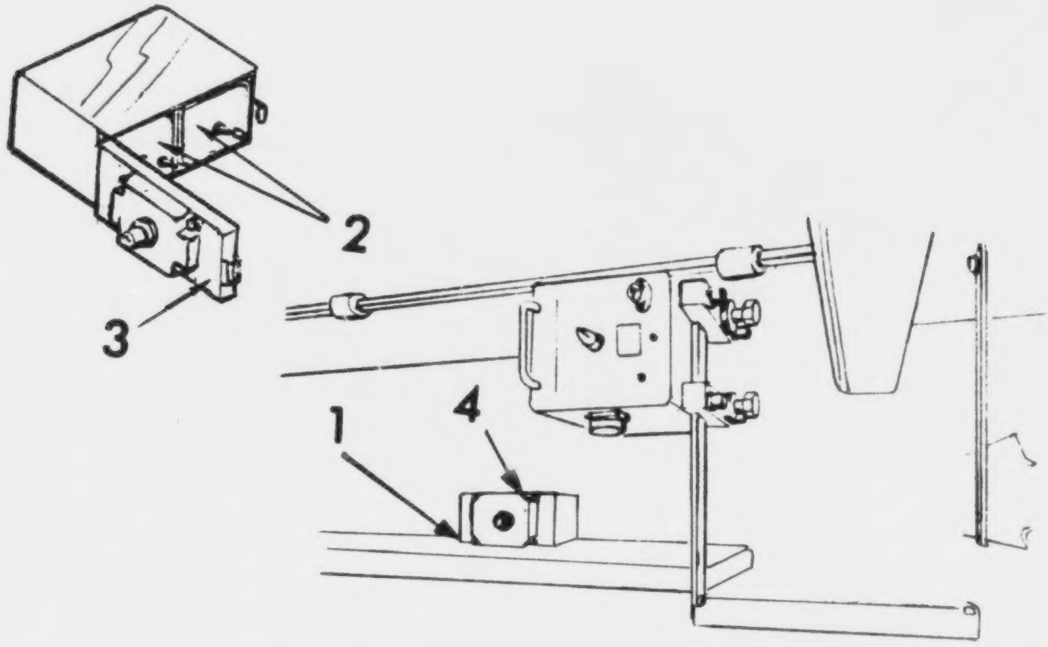
Two battery boxes are supplied. The MILES M113 APC transit case and the MILES VULCAN, Self-Propelled transit case each contain a battery box. Use either battery box for this task.

Inspect battery box (1) for damage that would prevent normal operation.

Make sure fastener tape (2) is attached to one side of battery box. If tape is missing, do not attempt to install new tape. Turn battery box in.

Report any damage on DA Form 2404. Replace if damaged.

Inside Installation Task 3: Install Inside Battery Box.



Clean an area approximately 3 inches by 5 inches on night sight shelf (1).

WARNING

Primer is highly inflammable. Do not spray near Heat, Sparks, or Open Flame. No Smoking. Use only in well-ventilated area.

Apply primer (see Item 3, Appendix D) to clean area. Allow primer to dry 3 to 5 minutes before applying fastener tape.

Cut two 6-inch strips of fastener tape and remove paper backing, (see Item 4, Appendix D). Install tape on primed and dried (tacky) surface using a roller (see Item 4, Appendix C). Roll firmly to insure a smooth surface.

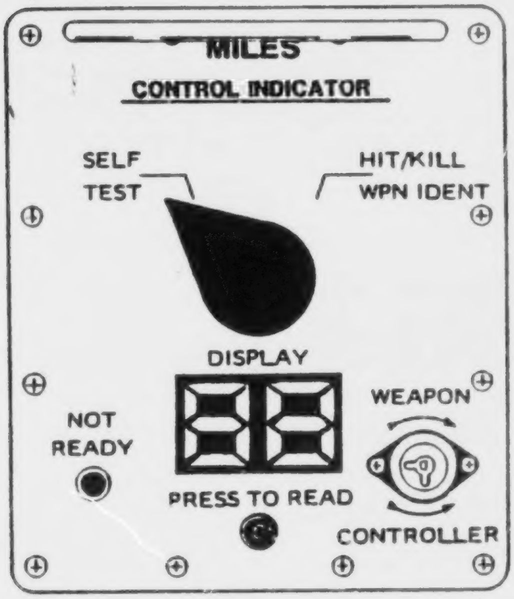
Insert two 6 V batteries (2) in each box.

If a battery is sticky from acid leakage, ask your NCOIC for a replacement.

Close and latch battery box cover (3).

Install battery box (4) as shown by meshing fastener tape on battery box firmly into fastener tape you installed.

Inside Installation Task 4: Inspect Control Indicator Assembly.


MILES
CONTROL INDICATOR
SELF TEST
HIT/KILL
WPN IDENT
DISPLAY
NOT READY
WEAPON
PRESS TO READ
CONTROLLER

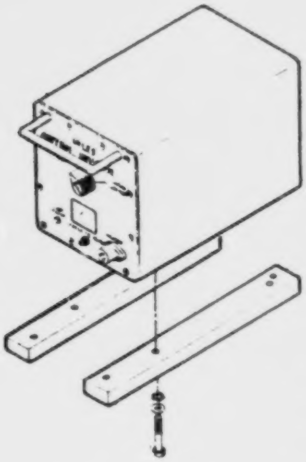
Inspect Control Indicator Assembly for any damage that would prevent normal operation.

Report any damage on DA Form 2404. Replace assembly if damaged.

NOTE

Control Indicator Assembly (CIA) is supplied with the MILES M113 APC simulator system.

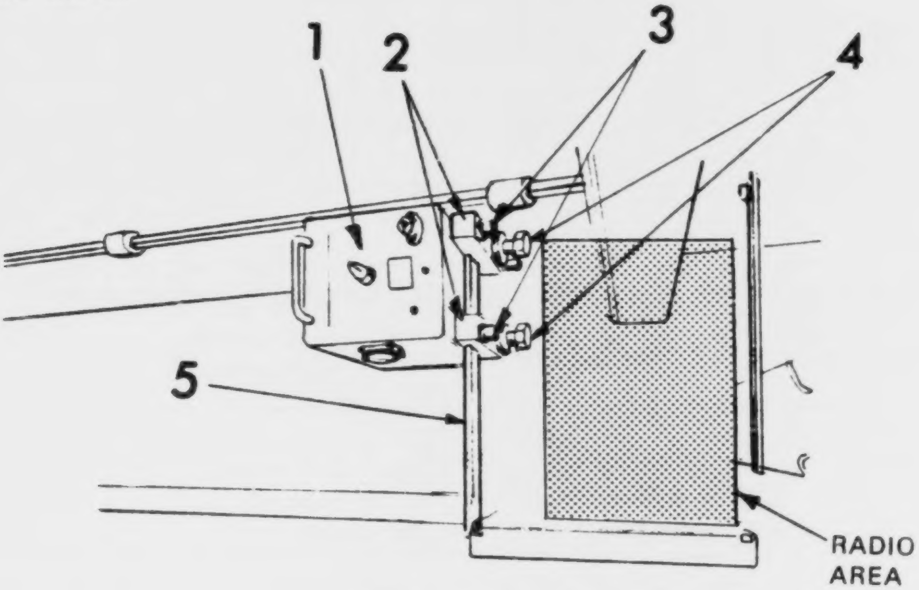
Inside Installation Task 5: Install Control Indicator Assembly (CIA).



NOTE

The CIA is to be installed over the night sight shelf located inside and in the middle of the right side of the vehicle.

Remove mounting adapters, washers, and bolts from MILES M113 APC CIA. Return items removed to transit case. Use 7/16-inch socket wrench.



Remove two universal adapters from the MILES VULCAN Kit.

Position CIA on left support bar (5) that faces radio receiver.

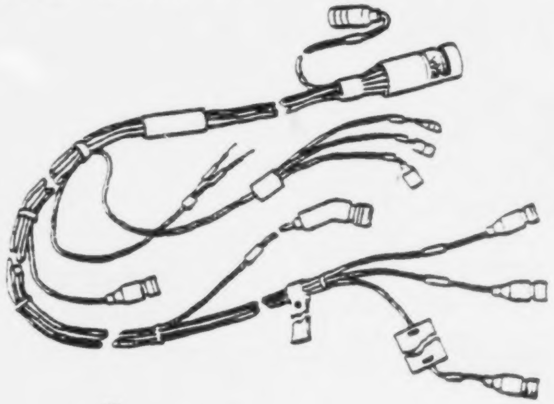
Install one universal adapter assembly (2) by inserting captive screws (3) into CIA. Tighten screws at the two places shown. Tighten hex bolt (4) against support bar.

Repeat procedure for second adapter assembly.

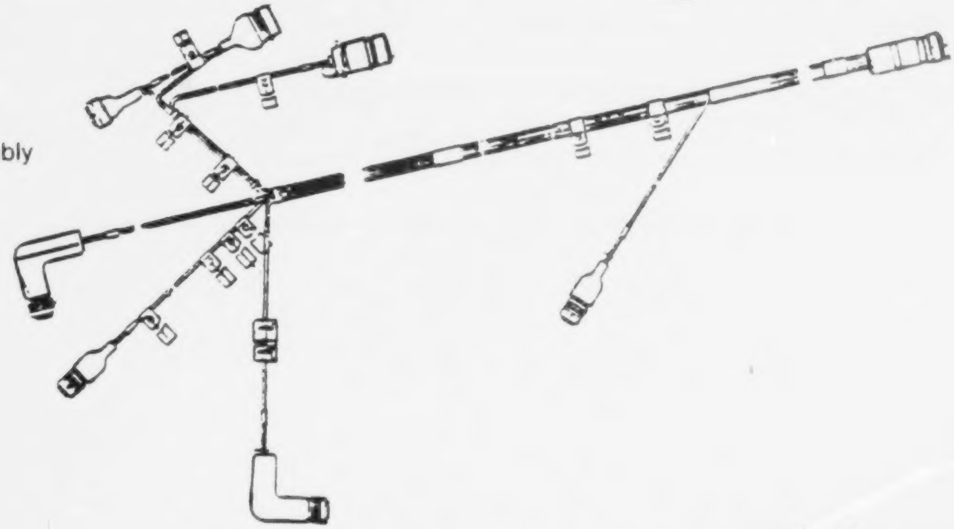
OUTSIDE CABLING TASKS - LIST

Task	Title	Page
1.	Obtain Equipment	2-43
2.	Inspect CVKI Cable Assembly	2-44
3.	Install CVKI Cabling	2-45
4.	Inspect MILES Vulcan System Cable Assembly	2-48
5.	Install ICA Cabling and Route Outside Cabling	2-49
5.1	Install Outside Battery Box Cabling	2-51
6.	Install FLASHWESS Cabling	2-52
7.	Install Laser Transmitter/Modulator Cabling	2-53

Outside Cabling Task 1: Obtain Equipment. Completion of cabling tasks requires equipment listed and illustrated below. Locate and set aside this equipment.

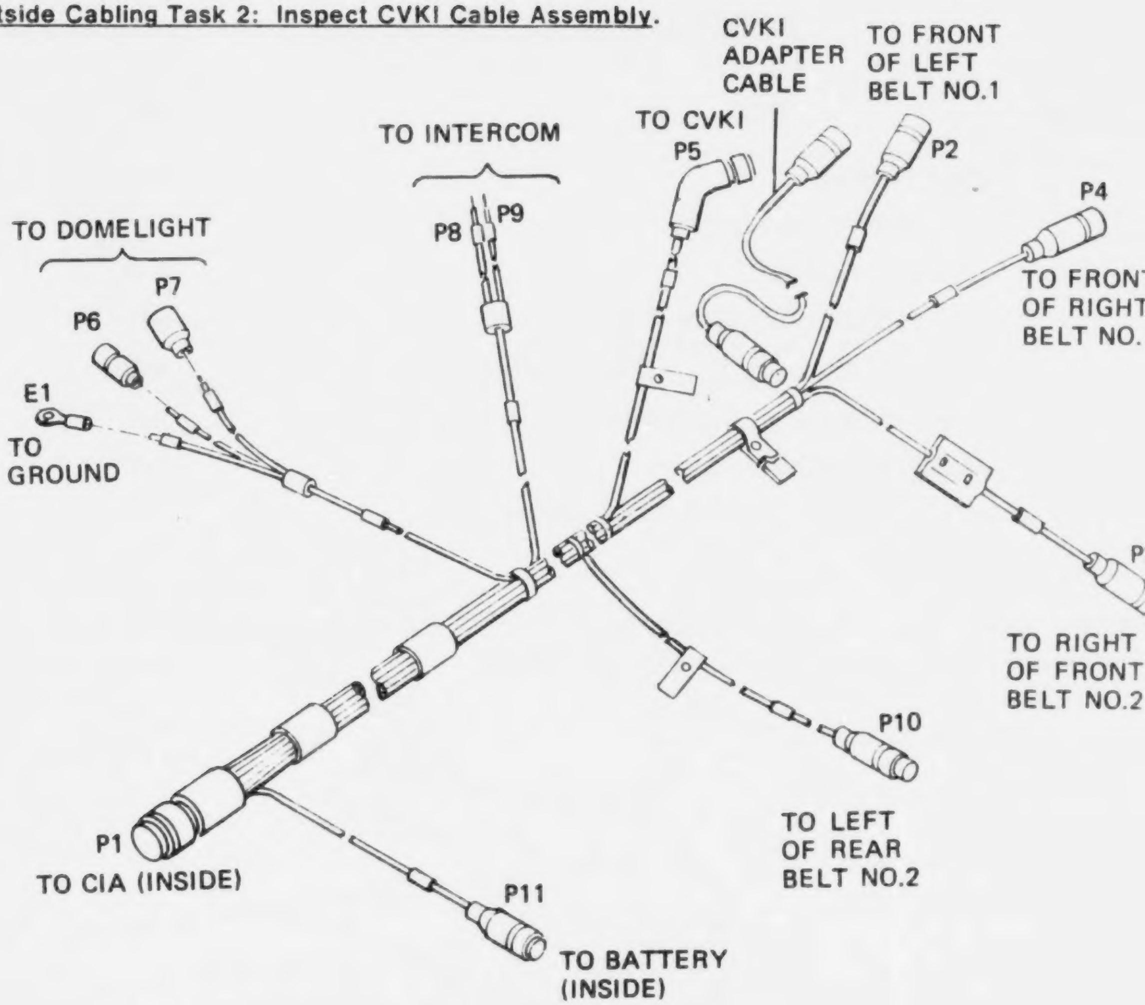


CVKI Cable Assembly
(From MILES M113 APC Kit)



VULCAN Cable Assembly

Outside Cabling Task 2: Inspect CVKI Cable Assembly.


CVKI
ADAPTER
CABLE
TO FRONT
OF LEFT
BELT NO.1
TO CVKI
P5
P2
TO INTERCOM
P4
P8
P9
TO DOMELIGHT
TO FRON
OF RIGHT
BELT NO.
P7
P6
E1
TO
GROUND
P
TO RIGHT
OF FRONT
BELT NO.2
P10
TO LEFT
OF REAR
BELT NO.2
P1
TO CIA (INSIDE)
P11
TO BATTERY
(INSIDE)

Find cable assembly labeled **CVKI** (From MILES M113 APC Transit Case).

Check each cable for worn insulation.

Each connector should have a label showing where it goes.

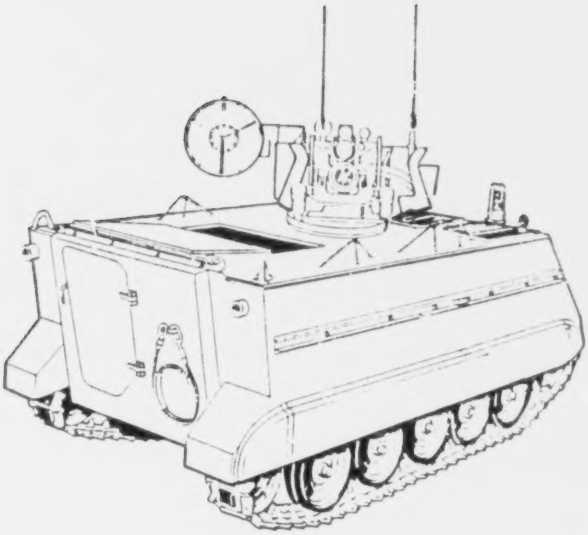
Check all connectors for obvious damage.

Report any damage on DA Form 2404. Replace cable assembly if damaged.

Outside Cabling Task 3: Install CVKI Cabling.

WARNING

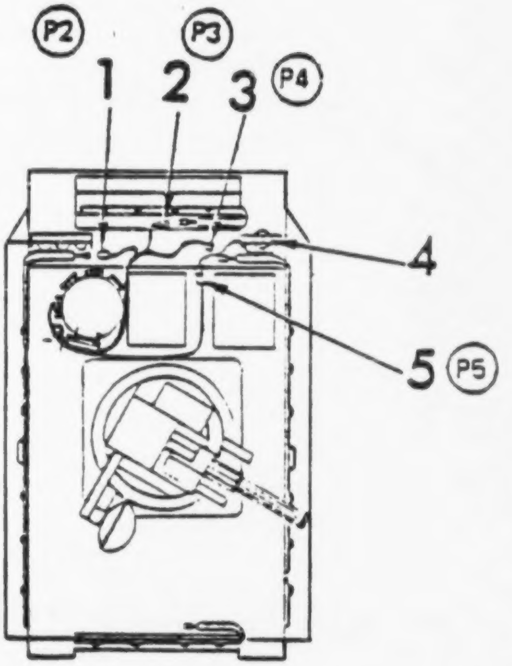
When operating in "Buttoned Up" conditions, the driver suffers some loss of visibility due to the cables which are routed through the left side periscope port of the Drivers hatch. Drivers must be made aware of the situation and take appropriate actions to ensure safe vehicle operation under these conditions. Failure to comply may cause damge to equipment and/or injury to personnel.



NOTE

Make sure gun is pointing over vehicle's right rear corner. Remove left periscope window. Outside cabling for the CVKI/detector belts consists of one integrated cable installed on vehicle topside and routed to the inside through the periscope port.

Outside Cabling Task 3: Install CVKI Cabling (Cont).



Place CVKI cabling on top of VULCAN vehicle near driver's hatch.

Find cable ends labeled P2, P3, P4, P5, and P10. These connect to belts and CVKI on top of vehicle.

Route P2, P3, and P4 between driver's hatch and air intake grills to front of vehicle.

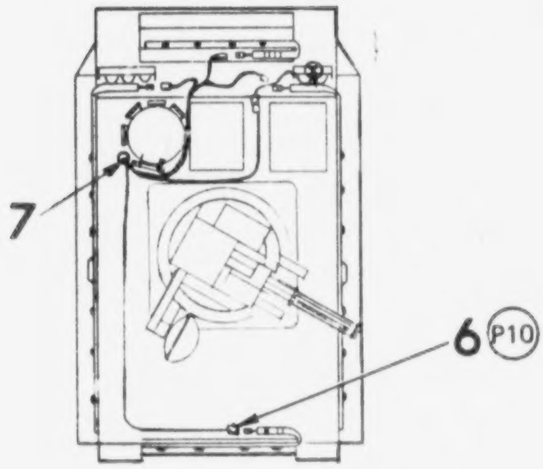
Connect P2 (1) to left-hand belt segment No. 1 connector.

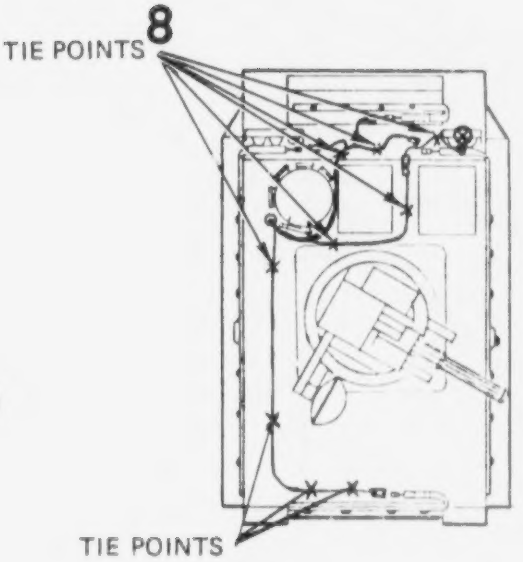
Connect P3 (2) to front belt segment No. 2 connector.

Connect P4 (3) to right-hand belt segment No. 1 connector.

Route P5 between exhaust grill and air intake grill toward, front of vehicle.

Connect P5 (5) to CVKI (4) using adapter cable between P5 and CVKI.





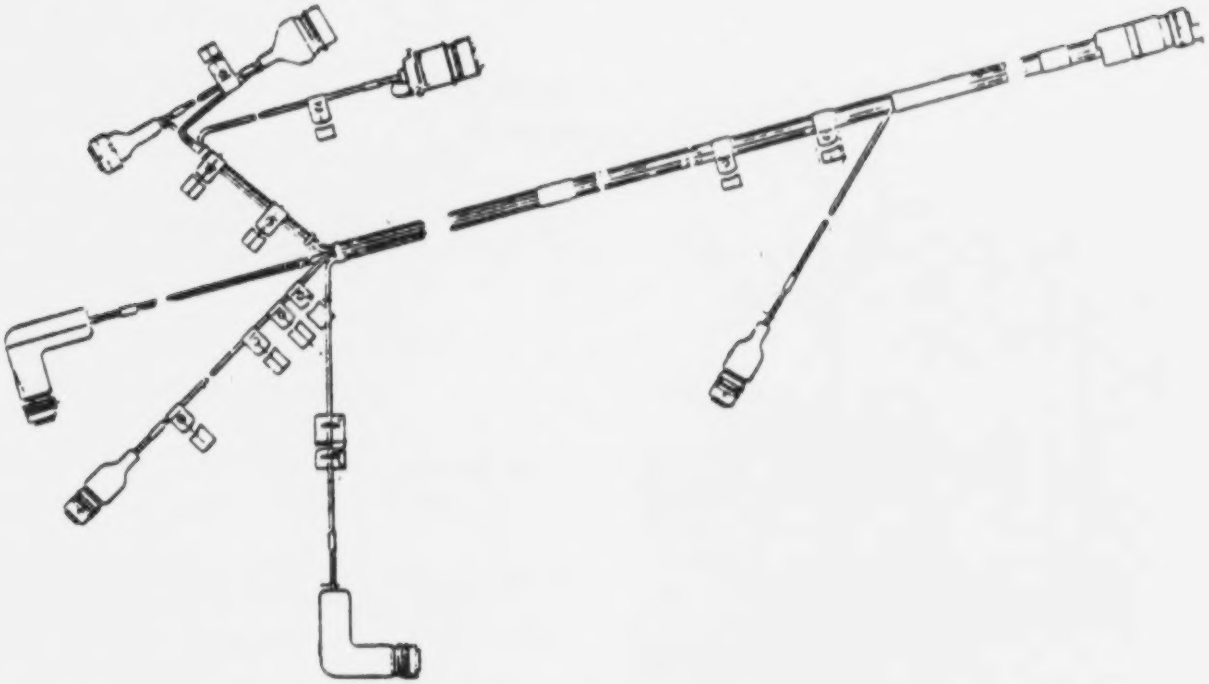
Route P10 along left side of top towards rear of vehicle.

Connect P10 (6) to rear belt segment No. 2.

Route remaining cable connector ends into vehicle through driver's left rear periscope port (7).

Use tie straps on cabling as you go. Attach cabling securely to tie points on vehicle surface (8).

Outside Cabling Task 4: Inspect MILES VULCAN System Cable Assembly.



Find cable assembly labeled **VULCAN SP SYSTEM**.

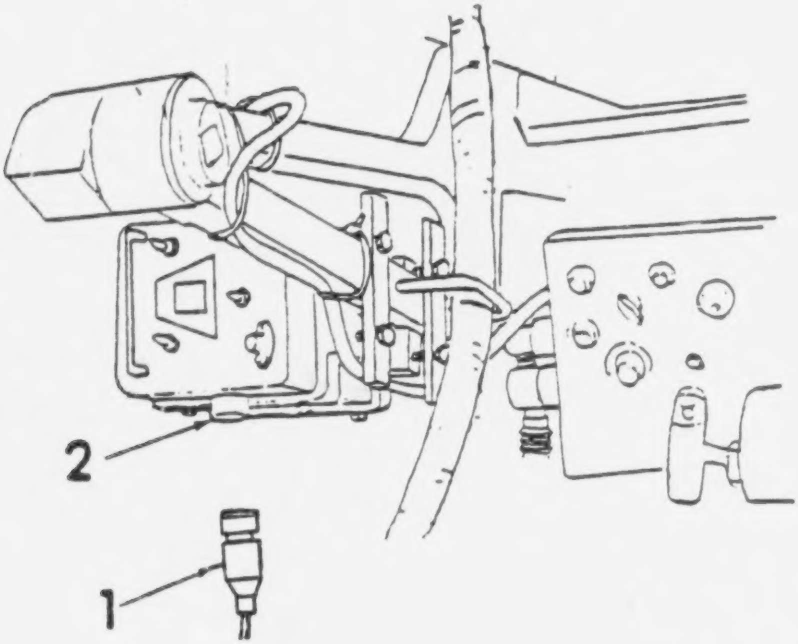
Check each cable for worn insulation and bare wires.

Each connector should have a label showing where it goes.

Check all connectors for obvious damage.

Report any damage on DA Form 2404. Replace cable assembly if damaged.

Outside Cabling Task 5: Install ICA Cabling and Route Outside Cabling.

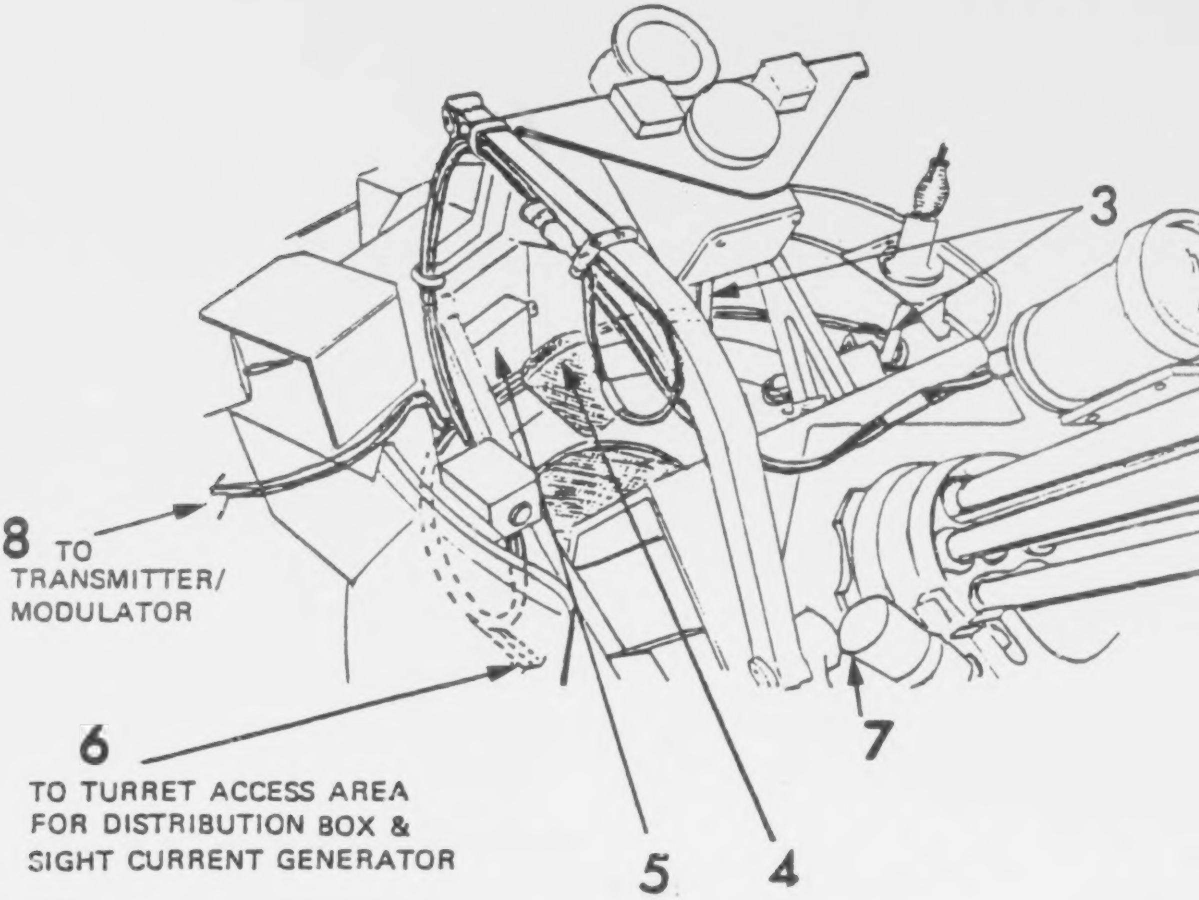


NOTE

Position gun to depress elevation.

Connect VULCAN cable assembly connector P1 (1) to ICA connector P1 (2).

Outside Cabling Task 5: Install ICA Cabling and Route Outside Cabling (Cont).


3
8 TO
TRANSMITTER/
MODULATOR
6
TO TURRET ACCESS AREA
FOR DISTRIBUTION BOX &
SIGHT CURRENT GENERATOR
7
5
4

Route P1 and P6 in a bundle behind brackets (3) towards ICA.

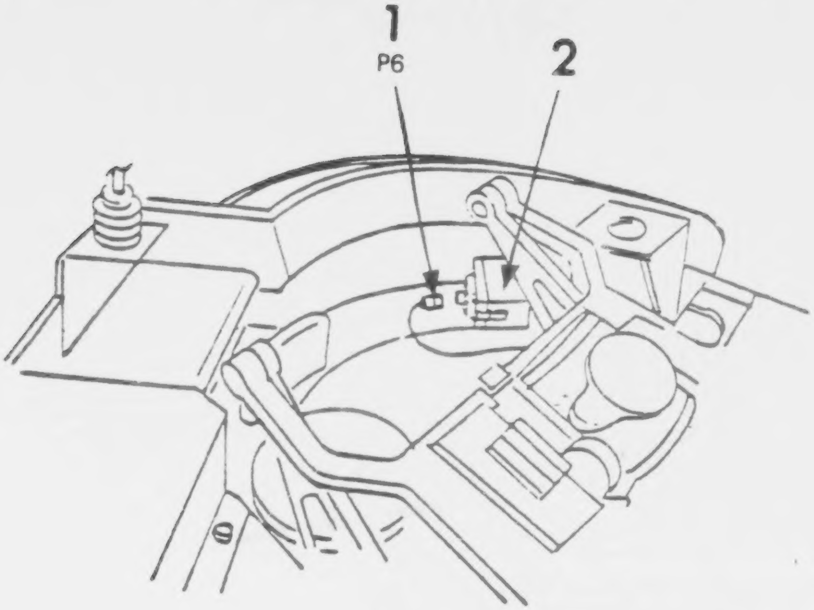
Route cable assembly connectors P2, P3, P4, P5, P7 and P8 in a bundle behind gunner's seat (4) a under radar power supplier (5).

Route P2, P3, and P4 past azimuth indicator (6) and into turret cabling access area.

Route P5 and P7 along lower right trunnion (7) toward gun barrel area.

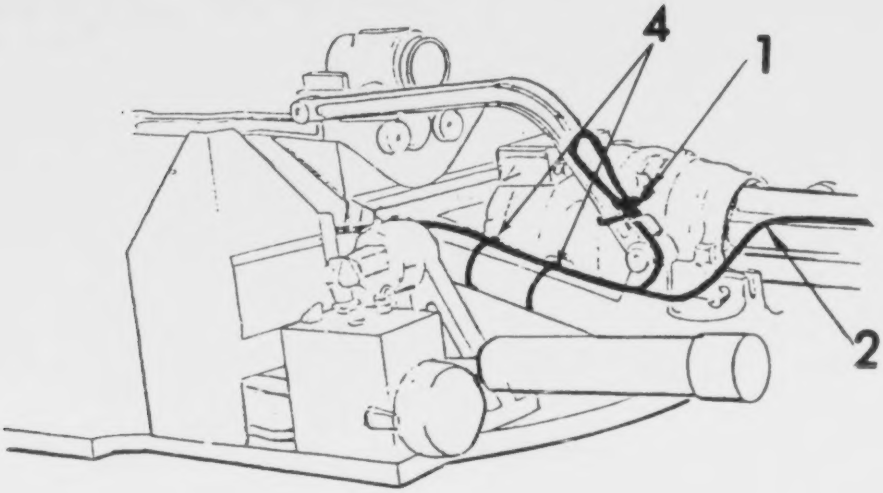
Route P8 around radar link guard and up toward laser transmitter (8).

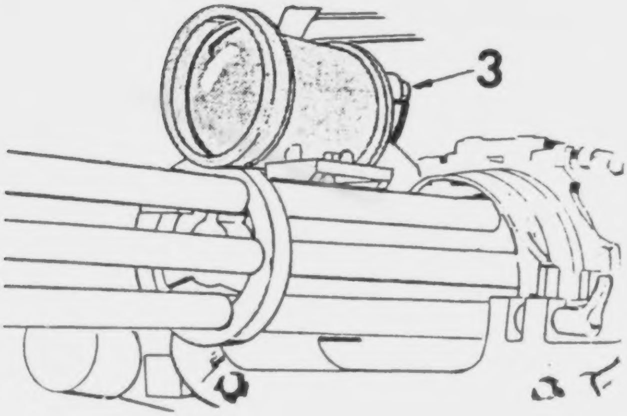
Outside Cabling Task 5.1: Install Outside Battery Box Cabling.



Connect cable assembly connector P6 (1) to battery box connector J6 (2).

Outside Cabling Task 6: Install FLASHWESS Cabling.





NOTE

Gun shield must be removed t
complete this task.

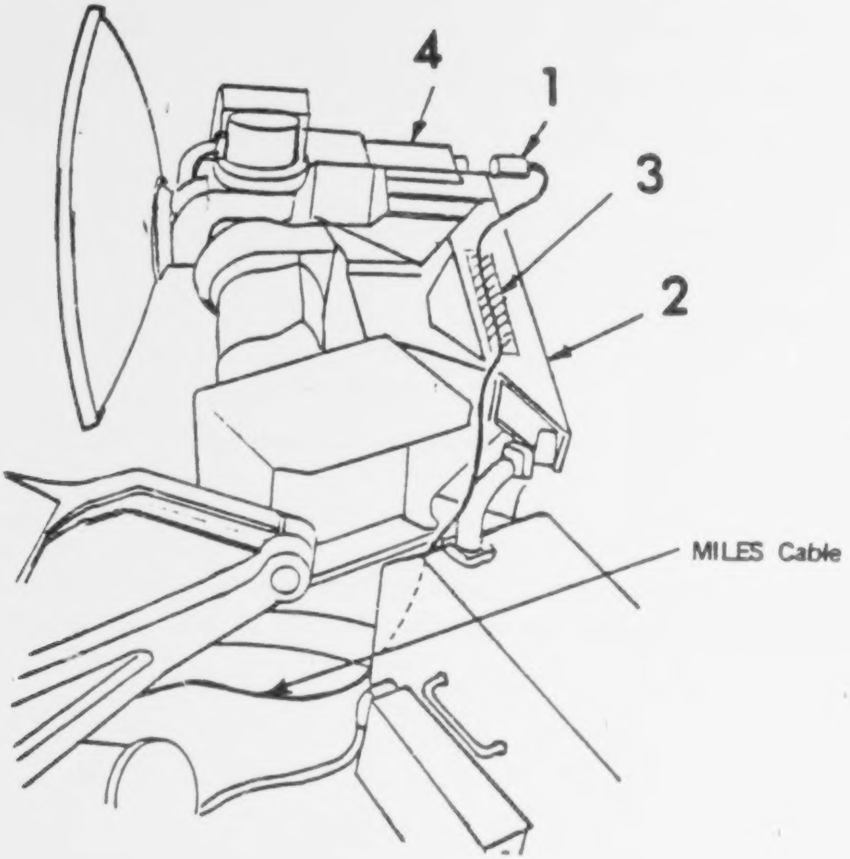
When FLASHWESS is used, a microphone is not required. Secure microphone cable and connector P
to right-hand pivot with fastener tape tie (1). Keep out of way.

Route P7 (2) to FLASHWESS area.

Connect P7 to FLASHWESS connector (3).

Secure to trunnion using tie straps (4) on cabling.

Outside Cabling Task 7: Install Laser Transmitter/Modulator Cabling.



NOTE

Manually elevate and depress gun and verify that there is no stress on cabling. Reposition cable if necessary.

Route P8 (1) of MILES VULCAN cable on top of waveguide guard (2). Secure cable to fastener tape at **(3)**.

Connect P8 to modulator (4).

INSIDE CABLING TASKS - LIST

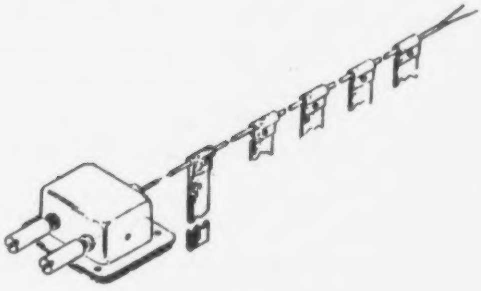
Task	Title	Page
1.	Obtain Equipment	2-54
2.	Install CVKI Cabling to Dome Light	2-55
3.	Install Cabling to Intercom, Control Indicator Assembly and Battery Box	2-57
4.	Install VULCAN System Cabling to Vehicle Power Distribution Box and Sight Current Generator	2-59
5.	Install Arming Plug	2-61

NOTE

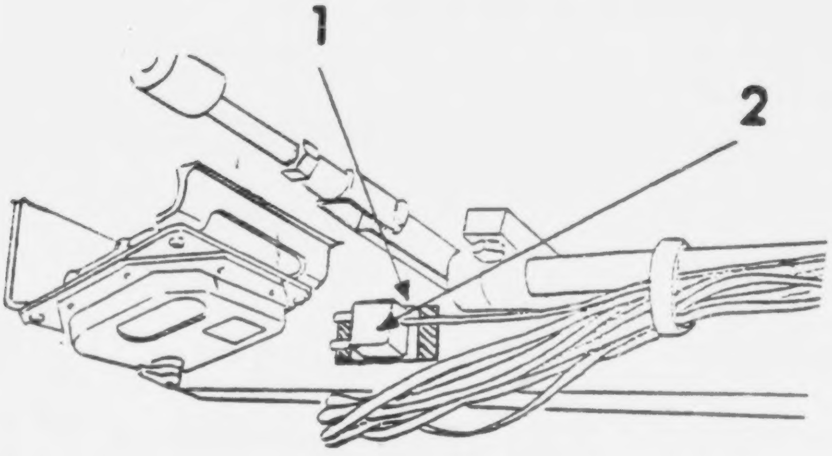
Perform these tasks in the order given.

Inside Cabling Task 1: Obtain Equipment. The following equipment is required to complete Insi Cabling Tasks. Obtain and set aside this equipment (See Item 3B, Section II, Appendix B).

Cable Extension Housing



Inside Cabling Task 2: Install CVKI Cabling to Dome Light.



NOTE

CVKI inside cabling connectors E1, P6, P7, P8, P9, P1, and P11 were routed inside through driver's periscope port during Outside Cabling Task 3: Install CVKI Cabling.

Clean an area at (1) approximately 3 inches by 3 inches for installing cable extension assembly housing (2). (See Item 3B, Appendix B.)

WARNING

Primer is highly inflammable. Do not spray near Heat, Sparks, or Open Flame. No Smoking. Use only in well-ventilated area.

Apply primer (see Item 3, Appendix D) to clean area at (1). Allow primer to dry 3 to 5 minutes before applying fastener tape.

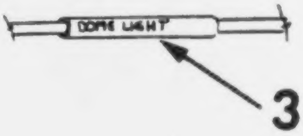
Remove paper backing from fastener tape (see Item 4, Appendix D). Install tape on primed and dried (tacky) surface using a hand roller (see Item 4, Appendix C). Roll firmly for a smooth surface

Install cable extension housing at (1) by meshing housing fastener tape into fastener tape you installed.

Inside Cabling Task 2: Install CVKI Cabling to Dome Light (Cont).

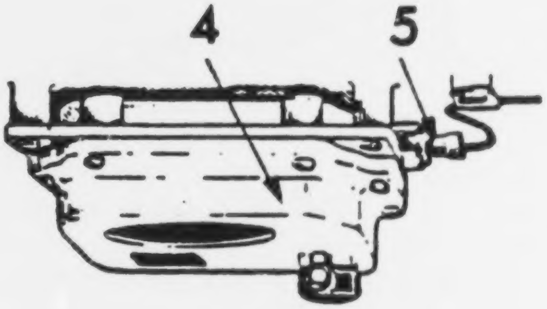
Find cables routed through driver's periscope port from CVKI and detector belts. Locate connectors P and P7, labeled DOME LIGHT (3) and ground connector E1.

Route P6, P7, and E1 to driver's dome light (4).



Pull plug (5) out of dome light. Put dome light plug into connector P7 (7).

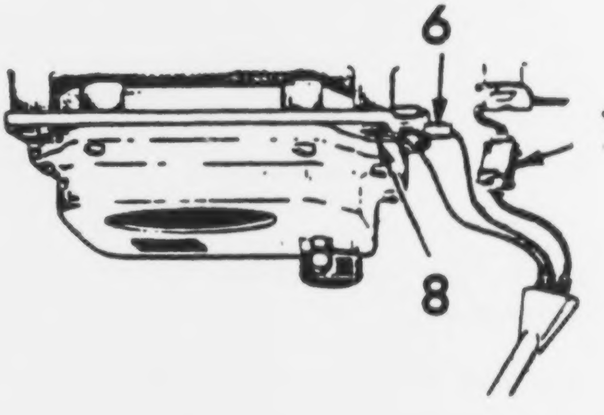
Plug connector P6 (6) into dome light.



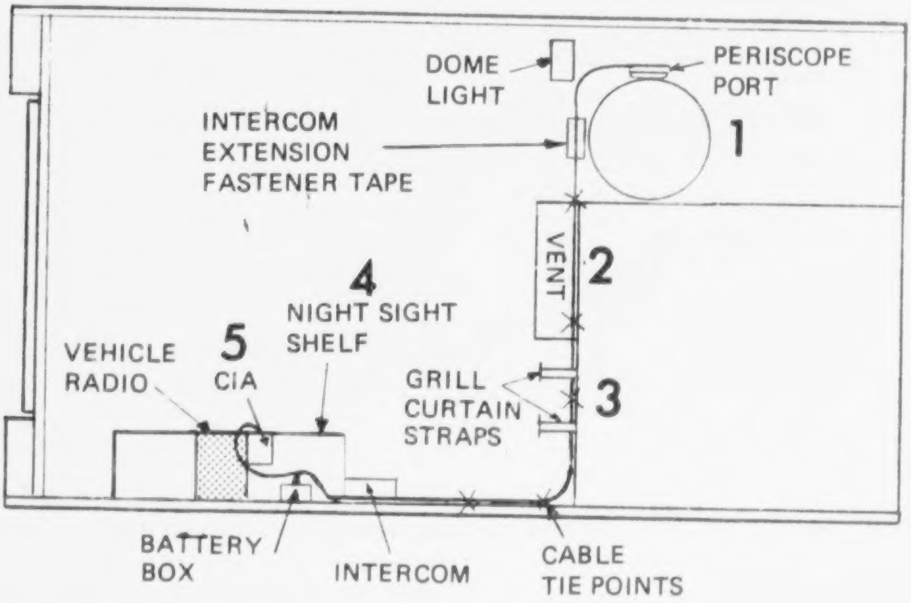
Remove closest dome light bolt (8). Scrape paint for good connection.

Slip bolt through MILES connector E1.

Make sure connector is touching bare metal. Tighten bolt.



Inside Cabling Task 3: Install Cabling to Intercom, Control Indicator Assembly and Battery Box.


DOME LIGHT
PERISCOPE PORT
INTERCOM EXTENSION FASTENER TAPE
1
VENT
2
4
NIGHT SIGHT SHELF
VEHICLE RADIO
5
CIA
GRILL CURTAIN STRAPS
3
BATTERY BOX
INTERCOM
CABLE TIE POINTS

NOTE

Position gun barrels to point toward right rear corner of vehicle.

Plug connectors P8 and P9 into cable extension assembly posts.

Secure cables P6, P7, and E1 with tape tie-downs.

Locate connectors P1, (labeled CONTROL INDICATOR) and P11, (labeled BATTERY) and gather together with the intercom extension cable into a bundle for routing.

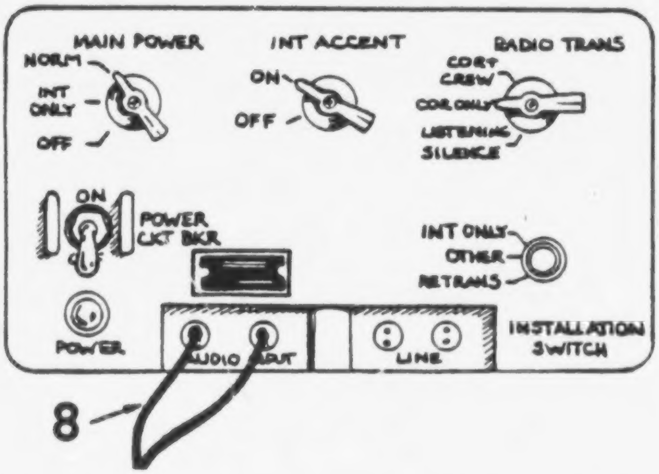
Route P1, P11, and intercom extension over exhaust vent (1) and under air grille curtain straps (2).

NOTE

Tie cable in place with cable ties as you go.

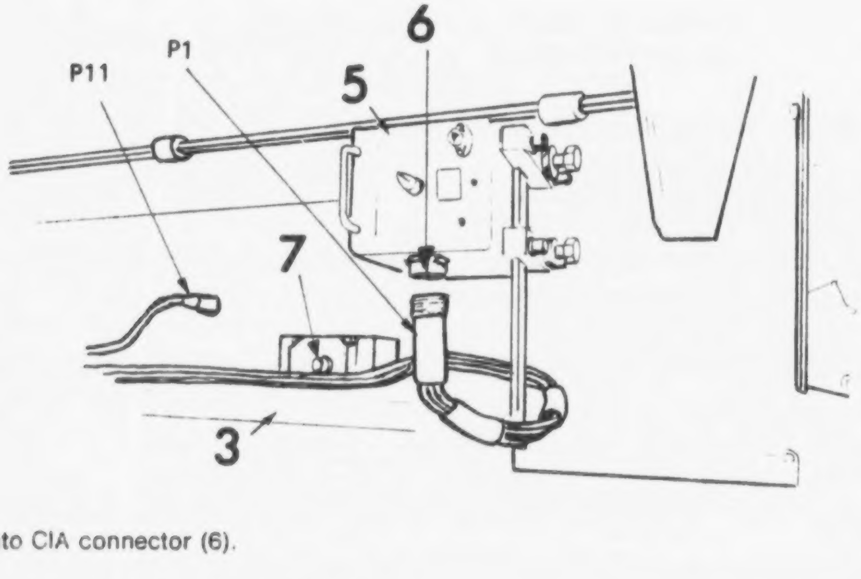
Continue to route cabling around corner toward night sight shelf (3).

Inside Cabling Task 3: Install Cabling to Intercom, Control Indicator Assembly and Batter Box (Cont).


MAIN POWER
NORM
INT ONLY
OFF
INT ACCENT
ON
OFF
RADIO TRANS
CDR CREW
CDR ONLY
LISTENING SILENCE
ON
POWER CKT BKR
INT ONLY
OTHER
RETRANS
POWER
AUDIO INPUT
LINE
INSTALLATION SWITCH
8

Connect intercom extension cable assembly plugs into intercom AUDIO INPUT jacks (8).

Continue to route P1 and P11 on top of night sight shelf (4) to CIA (5) and battery box area.



Plug P1 into CIA connector (6).

Plug P11 into battery box connector (7).

Inside Cabling Task 4: Install VULCAN System Cabling to Vehicle Power Distribution Box and Sight Current Generator for the VULCAN Weapons System and the Fire Control Processor for the PIVADS Weapon System

NOTE

Position gun barrels to point toward right rear corner of vehicle.

VULCAN system inside cabling connectors P2, P3, and P4 were routed inside through turret cabling access area during Outside Cabling Task 5: Install ICA Cabling.

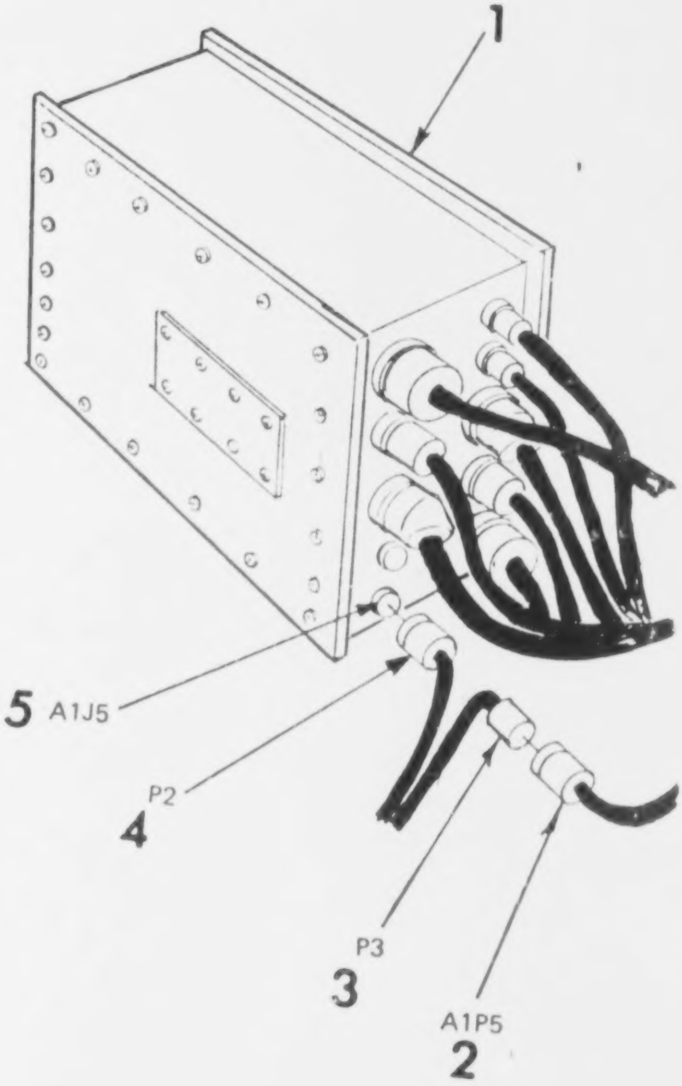
Find cables labeled P2, P3, and P4 routed through turret cabling access areas.

Route P2, P3, and P4 to area of vehicle power distribution box (1).

Unplug vehicle connector A1P5 (2) from A1J5 (5).

Connect P2 (4) to vehicle A1J5 (5).

Connect P3 (3) to A1P5 (2).



Inside Cabling Task 4: Install VULCAN System Cabling to Vehicle Power Distribution Box and Sight Current Generator for the VULCAN Weapons System and the Fire Control Processor for the PIVADS Weapon System (Cont)

VULCAN INSTALLATION

Connect P4 (7) to vehicle A21J7 (8) on sight current generator (6).

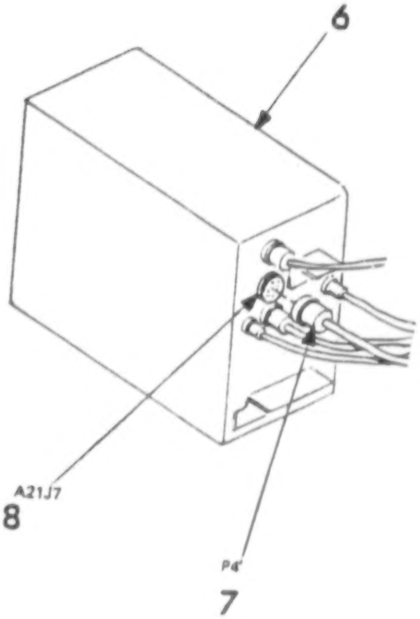
Secure to vehicle cable harnesses using tie straps on MILES cabling.

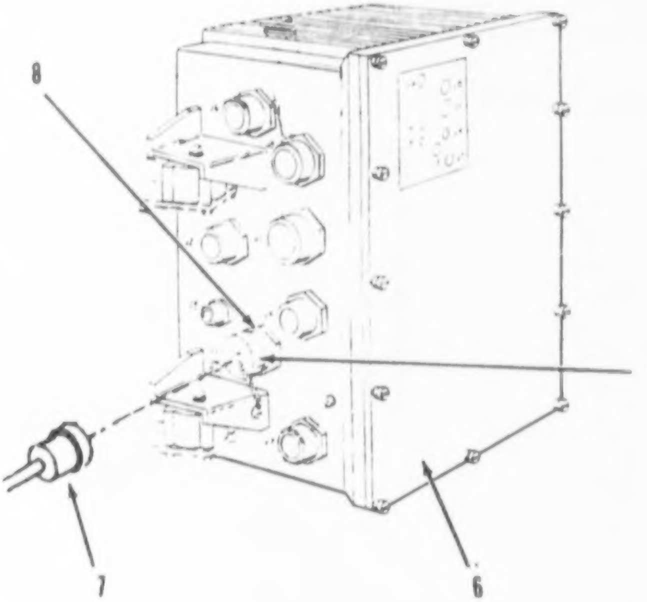
PIVADS INSTALLATION

Remove protective cover from A21J3 (9).

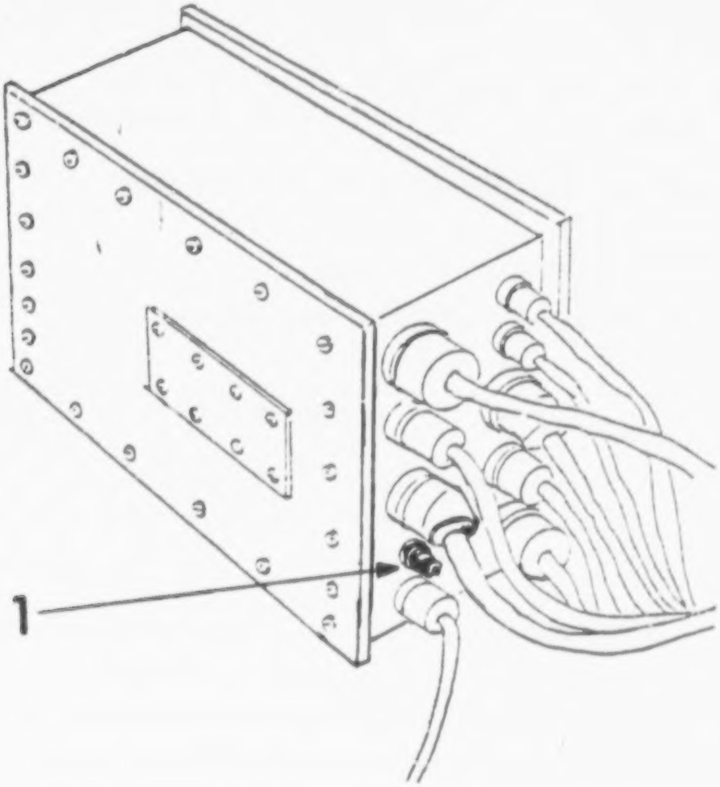
Connect P4 (7) to vehicle A21J3 (8) on fire control processor (6).

Secure to vehicle cable harnesses using tie straps on MILES cabling.





Inside Cabling Task 5: Install Arming Plug.



Install arming connector (1) on J6 outlet on vehicle power distribution box.

INITIAL ADJUSTMENTS, DAILY CHECKS AND SELF TEST

ALIGNMENT TASKS - LIST

Task	Title	Page
1.	Good visibility.	2-63
	Used when there is good visibility for at least 2500 meters.	
2.	Poor visibility.	2-65
	Used when visibility is limited to under 2500 meters.	

NOTE

Perform either Task 1 or Task 2 depending on visibility conditions.

WARNING

If task requires Vehicle and/or MILES Equipment Power to be turned ON, ensure Vehicle and/or MILES Equipment Power is turned OFF upon completion of task. Failure to comply may result in Personal Injury or Equipment Damage.

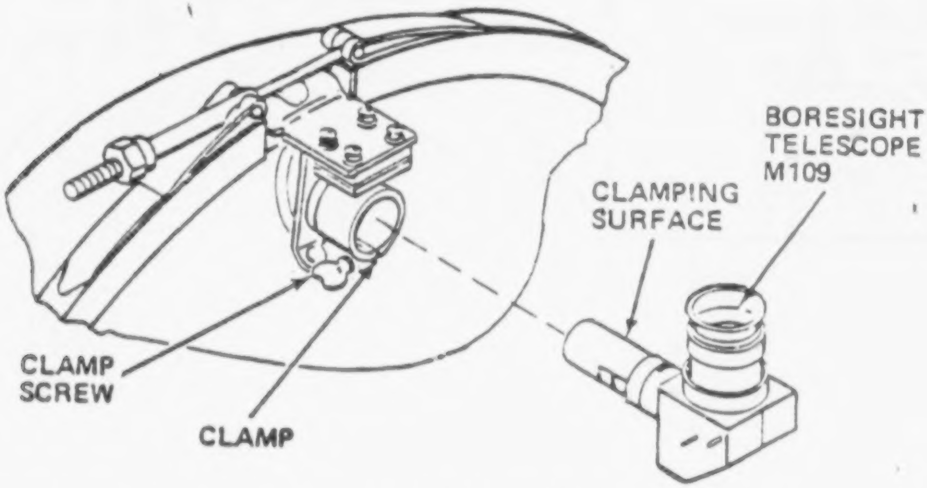
Alignment Task 1: Good Visibility.

THIS TASK IS THE SAME FOR BOTH THE ORIGINAL AND UPDATED BORESIGHT TELESCOPE MOUNTING BRACKET.

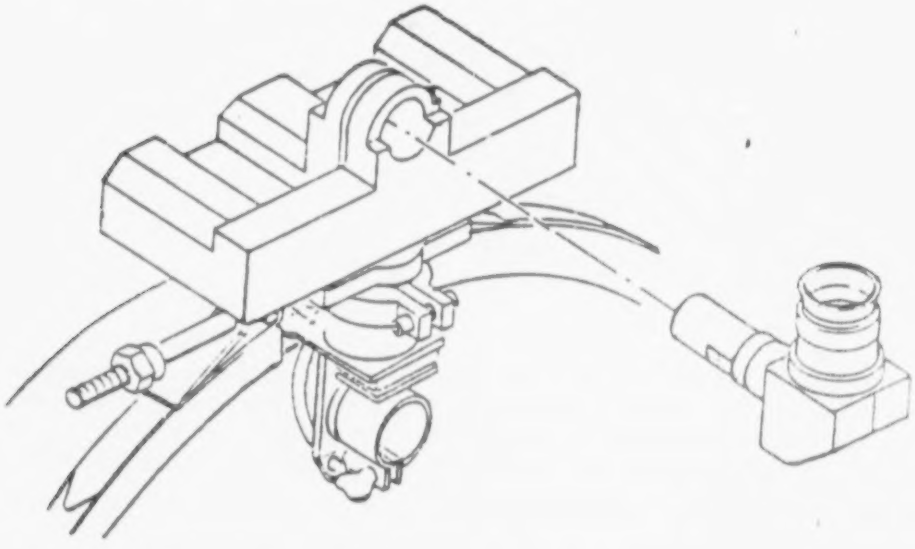
NOTE

VULCAN Range Only Radar (ROR) and gunner sight must be boresighted.

Perform normal VULCAN Boresight tasks for good visibility as described in TM 9-2350-300-10.


BORESIGHT
TELESCOPE
M109
CLAMPING
SURFACE
CLAMP
SCREW
CLAMP

Remove M109 boresight telescope from ROR boresight telescope clamp.

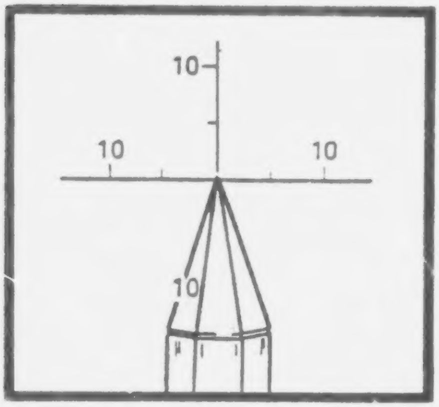


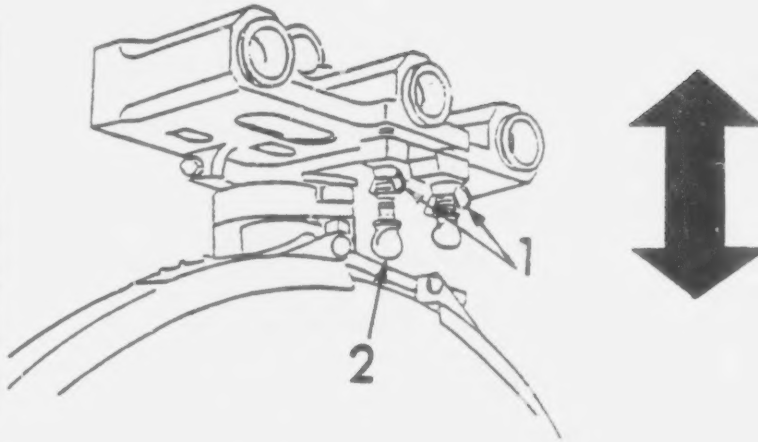
Install M109 boresight telescope in mount on top of laser transmitter.

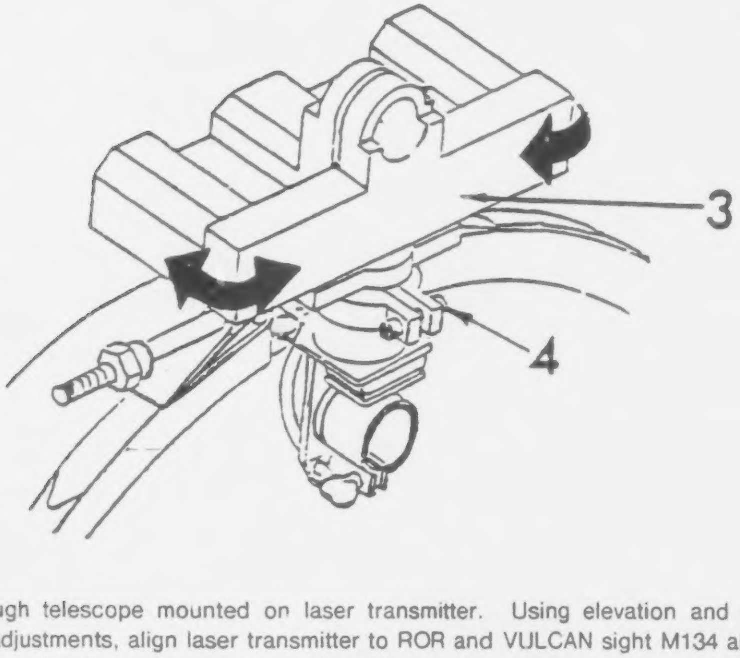
Alignment Task 1: Good Visibility (Cont).

Set boresight target at a range of approximately 2500 meters.

Turn system power ON and gun power OFF. Select RADAR mode.







Sight through telescope mounted on laser transmitter. Using elevation and transmitter base rotation (azimuth) adjustments, align laser transmitter to ROR and VULCAN sight M134 aiming point. Unlock wing nuts (1). For elevation adjustment use thumbscrews (2) starting at lowest setting. Lock elevation with wing nuts (1). For azimuth adjustment rotate transmitter (3) atop spacer. Lock azimuth with screw (4).

Remove telescope from laser transmitter after boresighting is completed.

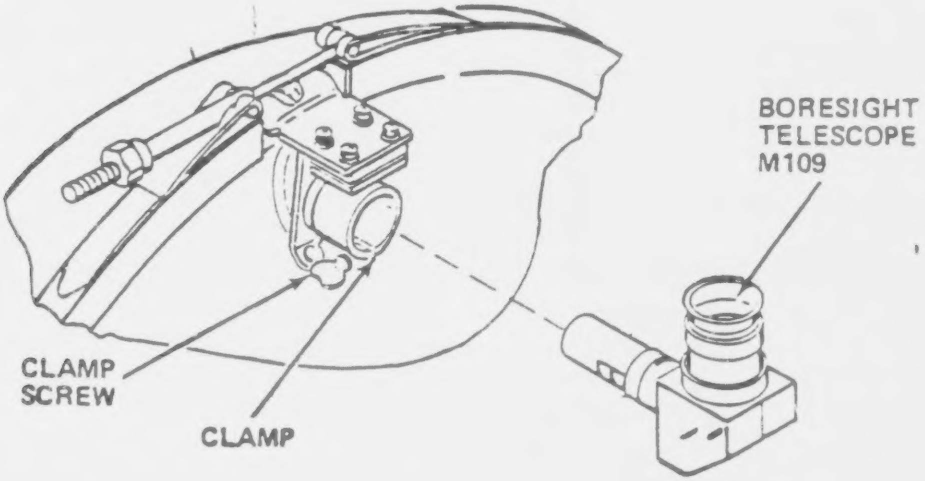
Alignment Task 2: Poor Visibility.

THIS TASK IS THE SAME FOR BOTH THE ORIGINAL AND UPDATED BORESIGHT TELESCOPE MOUNTING BRACKET.

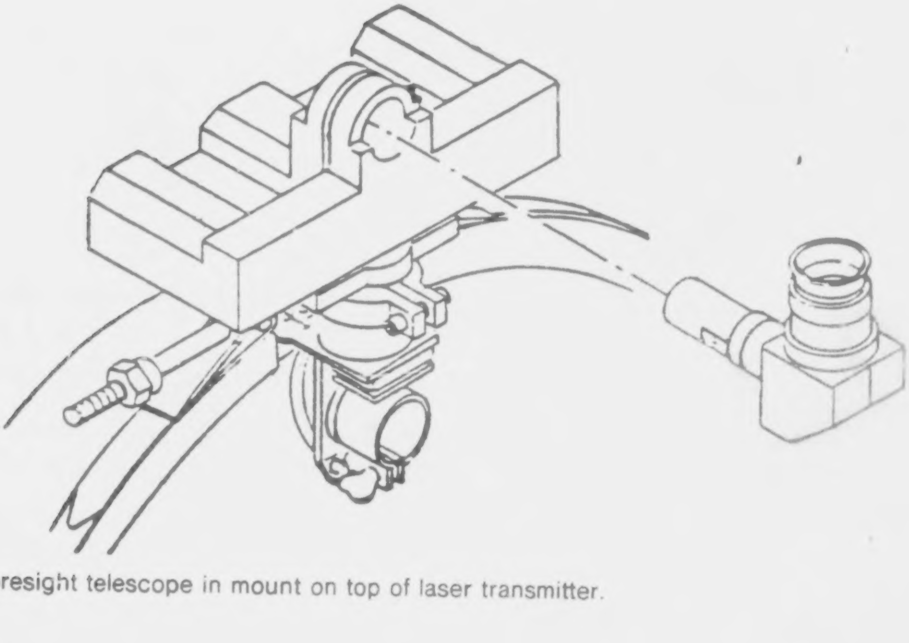
NOTE

VULCAN ROR and gunner sight must be boresighted.

Perform normal VULCAN Boresight tasks for poor visibility as described in TM 9-2350-300-10.



Remove M109 boresight telescope from ROR boresight telescope clamp.

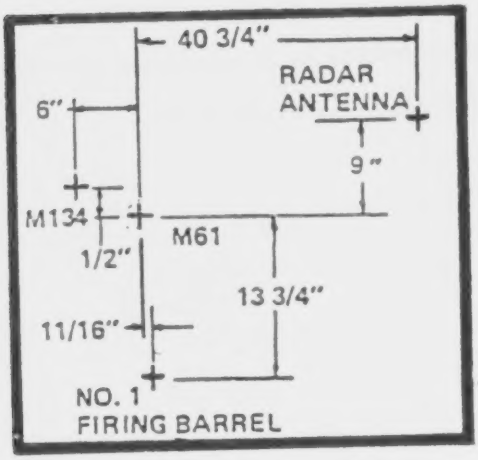


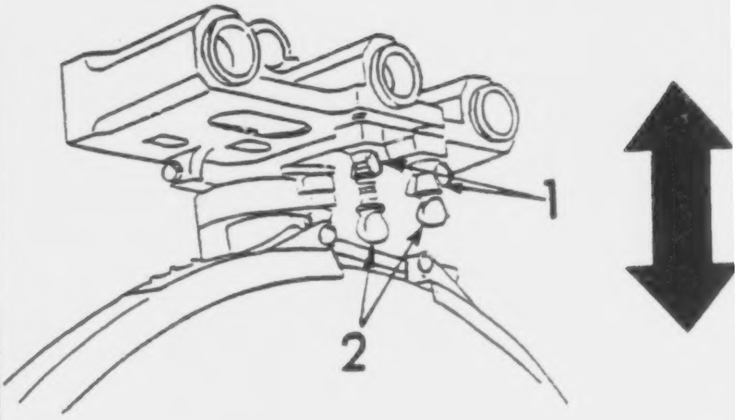
Install M109 boresight telescope in mount on top of laser transmitter.

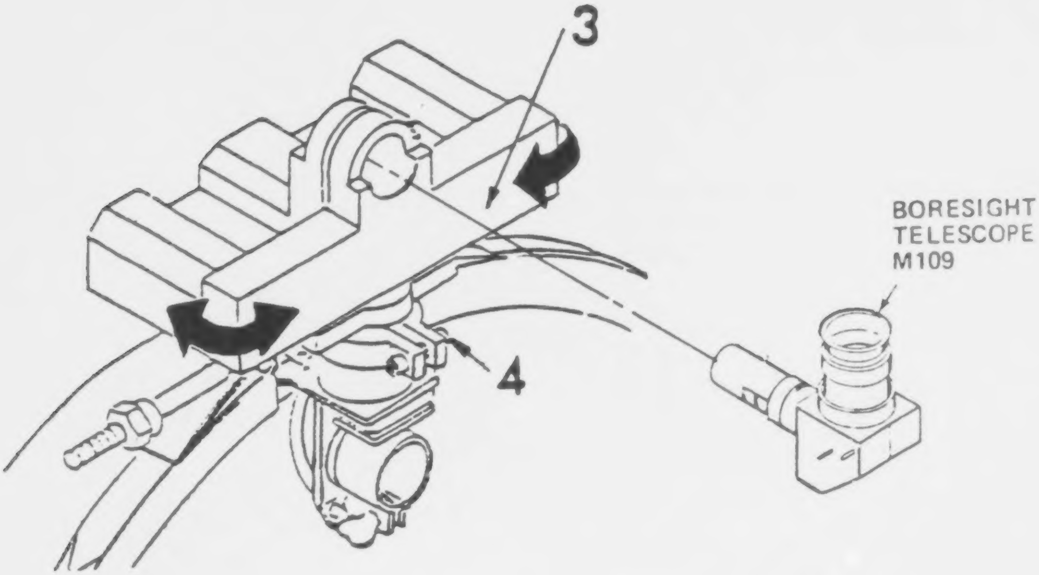
Alignment Task 2: Poor Visibility (Cont).

Set boresight target at a range of approximately 25 meters.

Turn system power ON and gun power OFF. Select RADAR mode.


40 3/4"
RADAR ANTENNA
6"
9"
M134
M61
1/2"
13 3/4"
11/16"
NO. 1 FIRING BARREL




3
4
BORESIGHT TELESCOPE M109

Sight through telescope mounted on laser transmitter. Using elevation and transmitter base rotation (azimuth) adjustments, align laser transmitter on radar antenna cross on target card. Unlock wing nuts (1). For elevation adjustment use thumbscrews (2) starting at lowest setting. Lock elevation with wing nuts (1). For azimuth adjustment rotate transmitter (3) atop flange. Lock azimuth with screw (4).

Remove telescope from laser transmitter after boresighting is completed.

TEST TASKS - LIST

Task	Title	Page
1.	CIA/CVKI Test	2-67
2.	Detector Belt Test	2-69
3.	ICA Test	2-70
4.	VULCAN Transmitter Test	2-72

NOTE

Perform these tasks in the order given.

WARNING

If task requires Vehicle and/or MILES Equipment Power to be turned ON, ensure Vehicle and/or MILES Equipment Power is turned OFF upon completion of task. Failure to comply may result in Personal Injury or Equipment Damage.

Test Task 1: CIA/CVKI Test.

NOTE

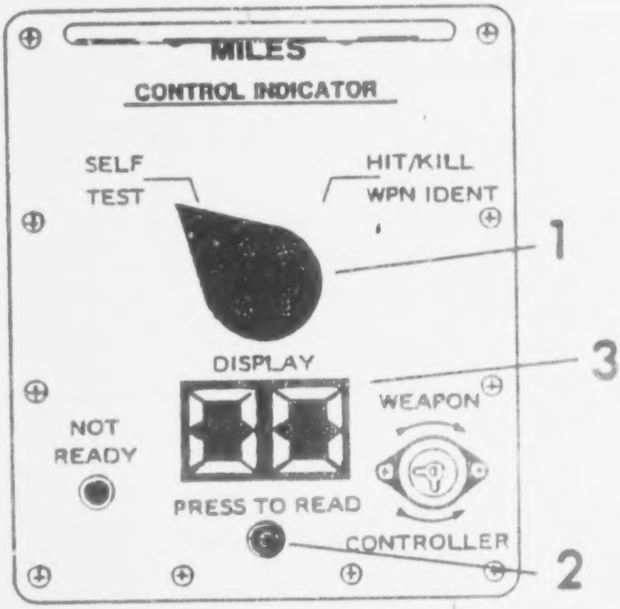
Before doing this task check with your gun crew chief to make sure all Outside and Inside Installation, and Cabling Installation tasks have been accomplished.

Turn MASTER POWER switch ON.

Turn Control Indicator Assembly switch (1) to SELF TEST.

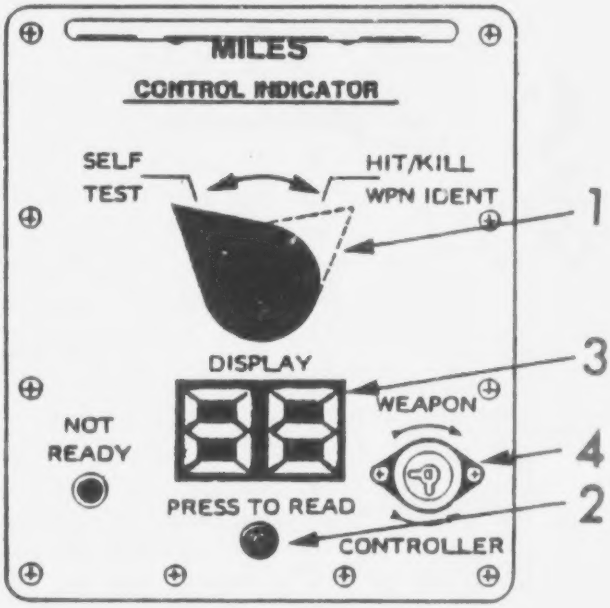
Press display button (2) on Control Indicator Assembly (CIA). Display (3) should show 00.

If display does NOT show 00, go to Troubleshooting, page 3-1.


MILES
CONTROL INDICATOR
SELF TEST
HIT/KILL
WPN IDENT
1
DISPLAY
3
NOT READY
WEAPON
PRESS TO READ
CONTROLLER
2

Test Task 1: CIA/CVKI Test (Cont).

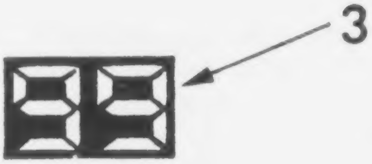
Ask Controller to reset system by inserting his Controller Green Key in key receptacle (4) on Control Indicator Assembly. Turn to CONTROLLER. Turn back and remove key.


MILES
CONTROL INDICATOR
SELF TEST
HIT/KILL WPN IDENT
1
DISPLAY
3
NOT READY
WEAPON
4
PRESS TO READ
2
CONTROLLER

Turn CIA switch (1) to HIT/KILL. Then turn to SELF-TEST. Press display button (2). Display (3) should show **88**.

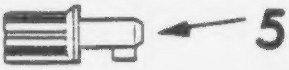
If display does NOT show 88, go to Troubleshooting, page 3-1.

Turn CIA switch (1) to HIT/KILL. Insert Orange Weapon Key (5) into Control Indicator Assembly receptacle (4). Turn key, then turn key back and remove. Verify that a tone sounds in the vehicle intercom and the CVKI light flashes continuously. Press display button (2). Verify display (3) shows **99**.

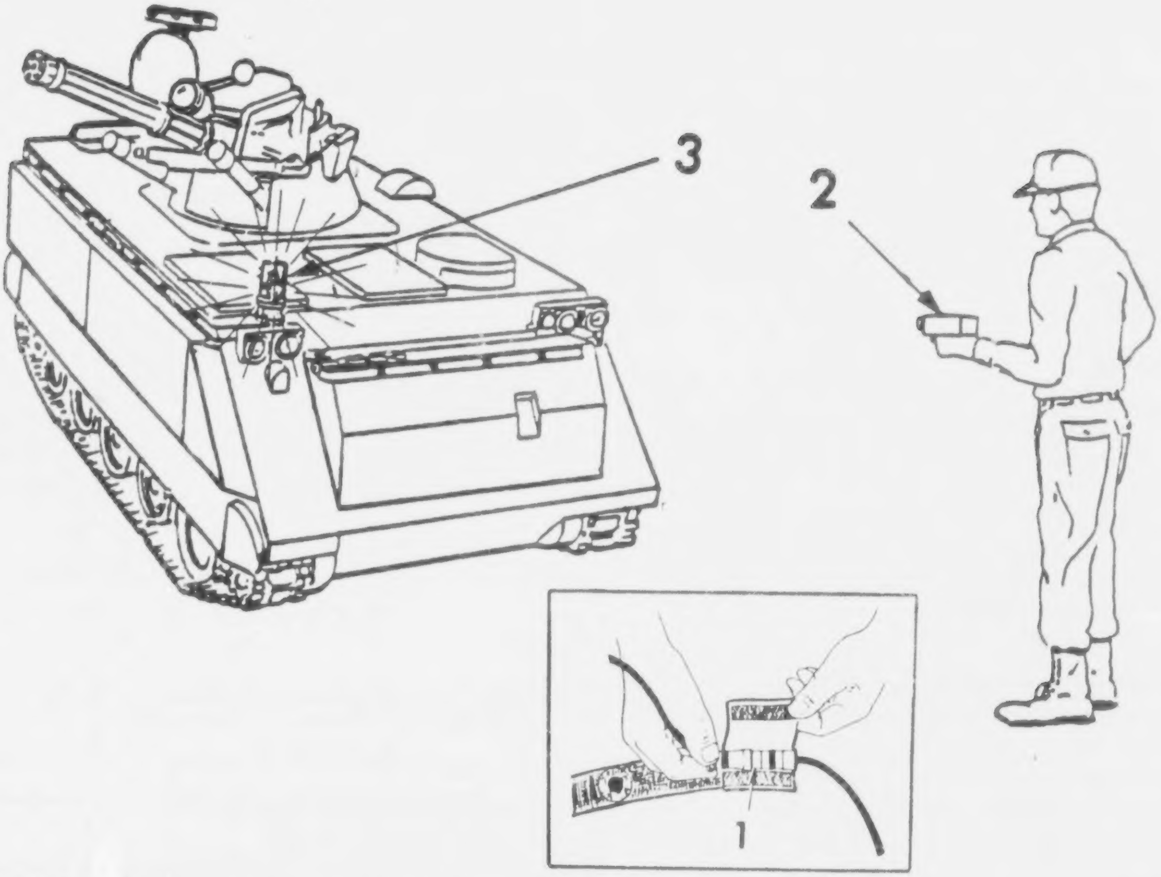


If no intercom tone, the CVKI does not flash or **99** is not displayed, go to Troubleshooting, page 3-1.

Ask Controller to reset system.



Test Task 2: Detector Belt Test.



Check that all cable connections (1) to detector belt segments are tight.

Ask controller to test your belt segments by aiming controller gun (2) at a detector and firing in "NEAR MISS" mode from a distance of 3 to 5 feet. Each time he fires, the CVKI light (3) should flash.

Test each belt segment by firing at all detectors.

If the CVKI fails to flash for some or all of the detectors, go to Troubleshooting, page 3-1.

NOTE

It is OK for one detector on each belt segment to be bad.

Test Task 3: ICA Test.

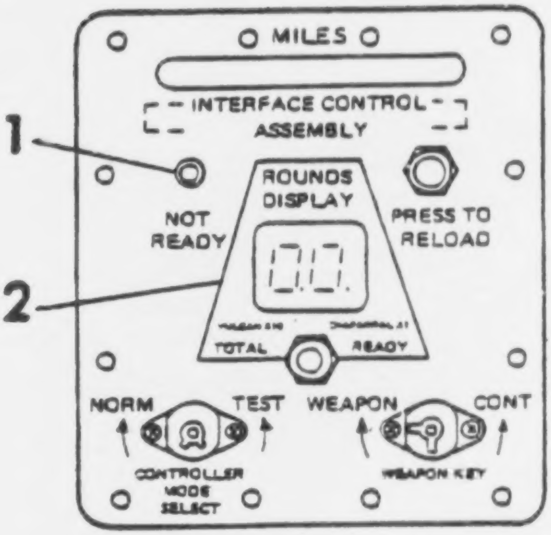
WARNING

Ensure VULCAN cannon motor connector W3P3 is disconnected.

Turn VULCAN system power ON (allow 2 minutes warmup).

Check ICA:

- NOT READY light (1) should be ON
- ROUNDS DISPLAY (2) should read 00 when moving rounds display switch to both TOTAL and READY


1
2
MILES
INTERFACE CONTROL ASSEMBLY
ROUNDS DISPLAY
NOT READY
PRESS TO RELOAD
TOTAL
READY
NORM
TEST
WEAPON
CONT
CONTROLLER MODE SELECT
WEAPON KEY

If display shows a number other than 00 or is blank; go to Troubleshooting, page 3-1.

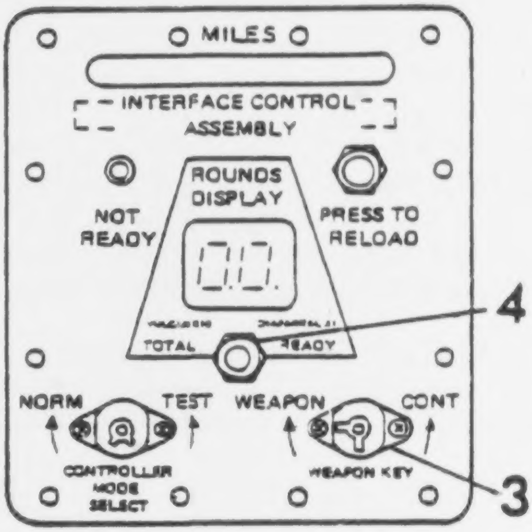
Ask Controller to reset system by inserting Controller (Green) Key in key receptacle (3) on ICA. Turn to CONT, then turn back and remove key.

Verify on ICA using TOTAL/READY toggle switch (4):

ROUNDS DISPLAY;

TOTAL 20

READY 11


MILES
INTERFACE CONTROL ASSEMBLY
ROUNDS DISPLAY
NOT READY
PRESS TO RELOAD
4
TOTAL
READY
NORM
TEST
WEAPON
CONT
CONTROLLER MODE SELECT
WEAPON KEY
3

ASK Controller to:

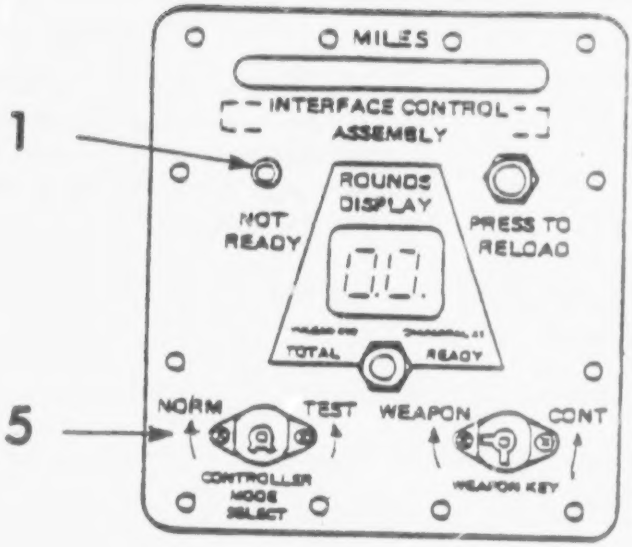
- Reset ICA
- Select TEST MODE (6)

Insert Weapon (Orange) Key into weapon key receptacle and rotate clockwise.

NOTE

If Controller and Weapon key functions are not performed, NOT READY indicator (1) will light on ICA.

Turn GUN POWER ON


1
5
MILES
INTERFACE CONTROL ASSEMBLY
NOT READY
ROUNDS DISPLAY
PRESS TO RELOAD
TOTAL
READY
NORM
TEST
WEAPON
CONT
CONTROLLER MODE SELECT
WEAPON KEY

Aim at target. Squeeze VULCAN trigger and action switches for BORESIGHTING.

When firing, note two decimal points on ICA ROUNDS DISPLAY. This indicates laser fire. Strobe flash in boresight target indicates laser hit.

Verify ROUNDS DISPLAY on ICA decreases after firing is completed.

NOTE

The M134 sight, ROR antenna, and laser transmitter may require re-adjusting after firing the laser transmitter at the boresight target.

Ask Controller to select NORM MODE (5). Squeeze VULCAN trigger and action switches. Verify FLASHWESS flashes.

Turn system power and gun power OFF.

Test Task 4: VULCAN Transmitter Test.

THIS TASK IS THE SAME FOR BOTH THE ORIGINAL AND UPDATED BORESIGHT TELESCOPE MOUNTING BRACKET.

NOTE

The target utilized for the VULCAN Transmitter Test must be at a distance of at least 1500 meters. Any suitable target may be used, however, it is recommended that the MILES Multiple Range Alignment Device, (MMRAD) be used for any laser transmitter testing.

Set up MMRAD at a range of at least 1500 meters.

Install four BA-200/U batteries (1).

Turn INDICATOR SELECT switch (2) to LONG RANGE.

Unlatch hinged panel assembly (3) and place in the DOWN position.

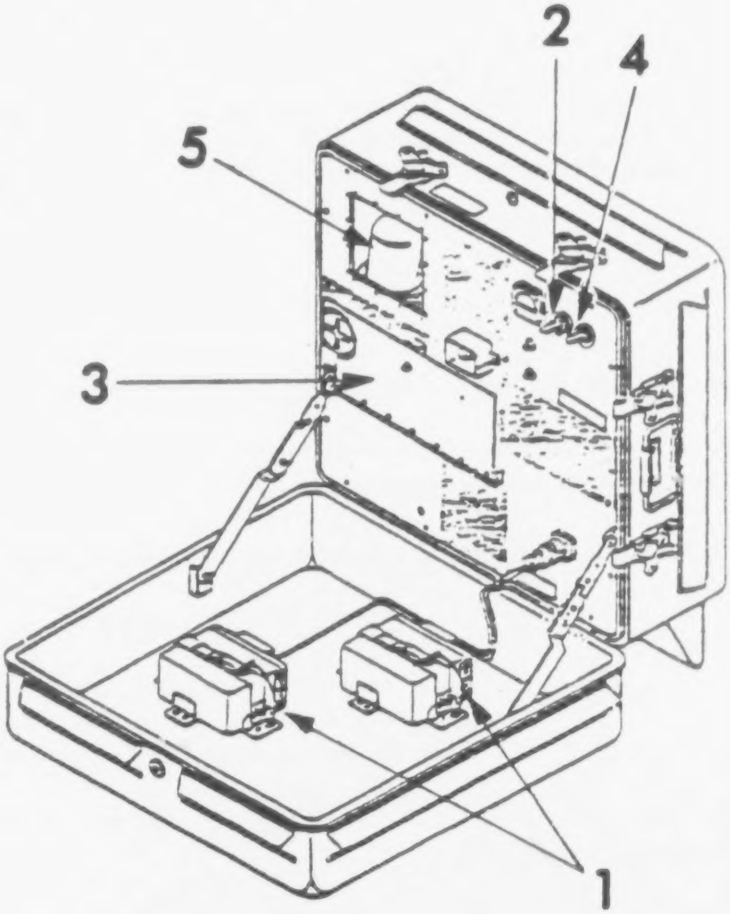
Turn POWER switch (4) ON.

Aim and fire VULCAN mounted transmitter at the center of the MMRAD.

The strobe light (5) on the MMRAD will flash each time a laser pulse from the laser transmitter is received.

If the strobe light fails to flash, check the transmitter alignment and retest.

If the strobe light fails to flash after realignment, the transmitter boresight procedure on page 2-63 and 2-65 should be followed and the transmitter retested.



If the strobe light does not flash after reboresighting the transmitter and retesting, substitute a Man Worn Laser Detector (MWLD) Torso Harness for the MMRAD, and repeat the test.

NOTE

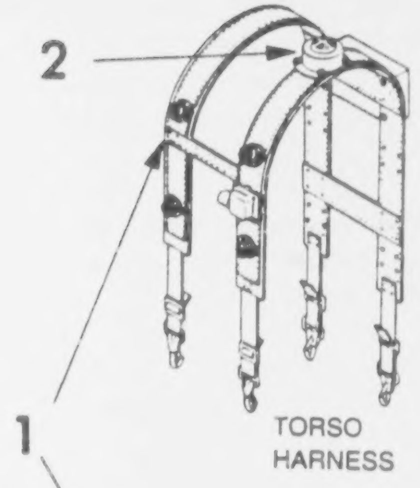
MWLD Torso Harness is supplied with the MILES 113 APC System.

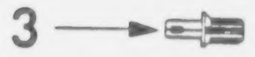
Align a detector (1) on the Torso Harness in front of the transmitter and retest. An alarm (2) on the harness should sound.

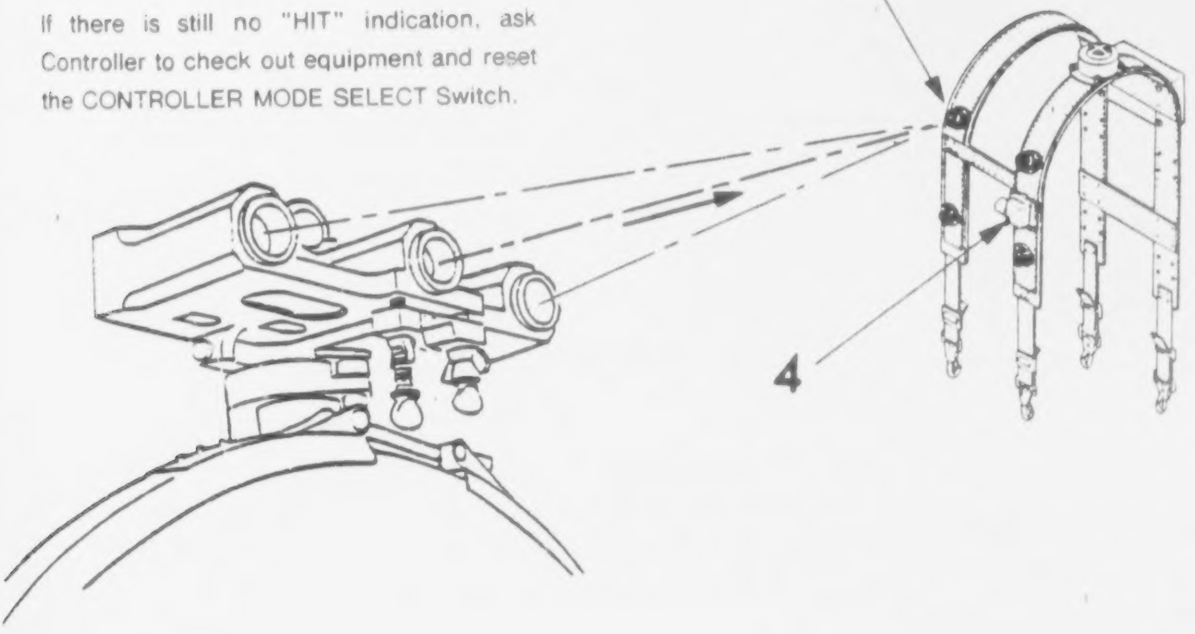
NOTE

The MWLD Torso Harness alarm is silenced by inserting a MILES supplied yellow key (3) into the key recepticle (4) on the harness and turning the key in a counterclockwise direction.

If there is still no "HIT" indication, ask Controller to check out equipment and reset the CONTROLLER MODE SELECT Switch.







Test Task 4: VULCAN Transmitter Test (Cont).

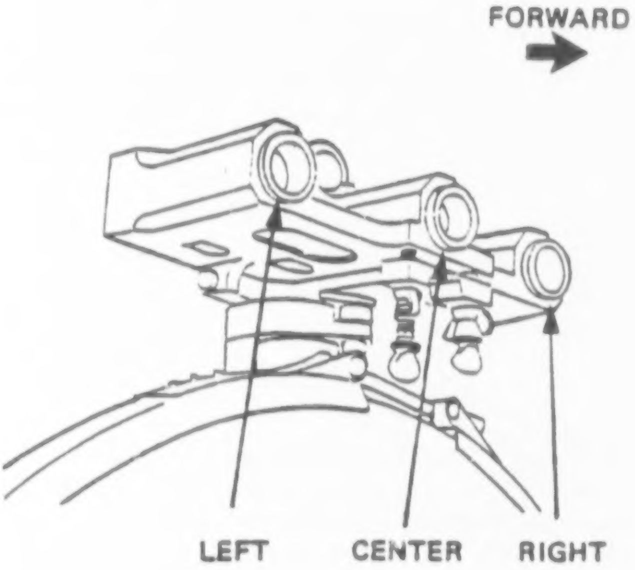
If there is a "HIT" indication, repeat the firing test while covering Center and Left Laser Tubes (1) with a helmet, hand, or any other opaque material. Note whether there is or is not a "HIT" indication.

Repeat firing test while covering the Center and Right Laser Tubes (2). Note whether there is or is not a "HIT" indication.

Repeat firing test while covering the Left and Right Laser Tubes (3). Note whether there is or is not a "HIT" indication.

If a "HIT" indication was received for each of the test conditions, all Laser Tubes are firing correctly.

If a "HIT" indication was not received for each of the test conditions, go to Troubleshooting, page 3-13 through 3-20 or 3-45 through 3-47.



HIT INDICATION

	LEFT	CENTER	RIGHT	YES	NO
	*	*	*		
1	*	*	▨		
2	▨	*	*		
3	*	▨	*		

OPERATING PROCEDURE

OPERATIONAL TASKS – LIST

Task	Title	Page
1.	Air Defense Operation	2-76
2.	Observing Your Target	2-78
3.	Recognizing Enemy Fire	2-79
4.	Resetting After a "KILL"	2-81

NOTE

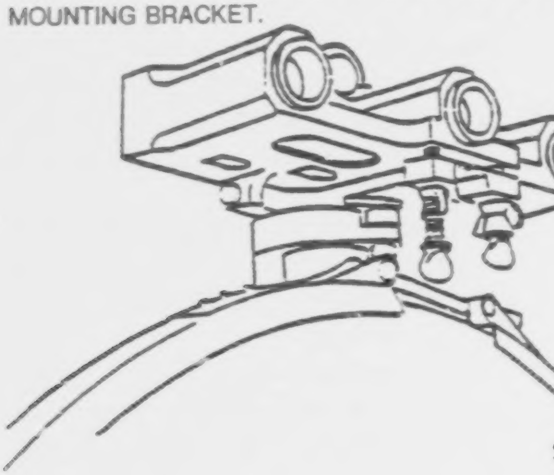
Perform Test Tasks (Page 2-67 daily).

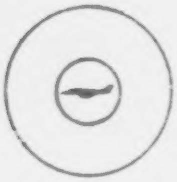
WARNING

If task requires Vehicle and/or MILES Equipment Power to be turned ON, ensure Vehicle and/or MILES Equipment Power is turned OFF upon completion of task. Failure to comply may result in Personal Injury or Equipment Damage.

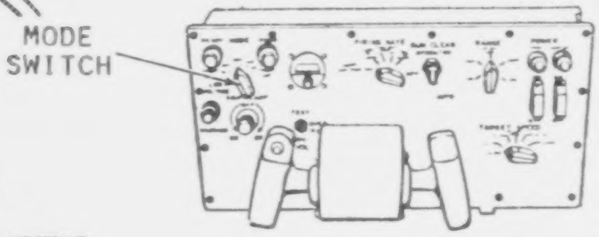
Operational Task 1: Air Defense Operation.

THIS TASK IS THE SAME FOR BOTH THE ORIGINAL AND UPDATED BORESIGHT TELESCOPE MOUNTING BRACKET.





AIRBORNE TARGET


MODE SWITCH

VULCAN CONTROL ASSEMBLY

Place VULCAN MODE switch in RADAR MODE.

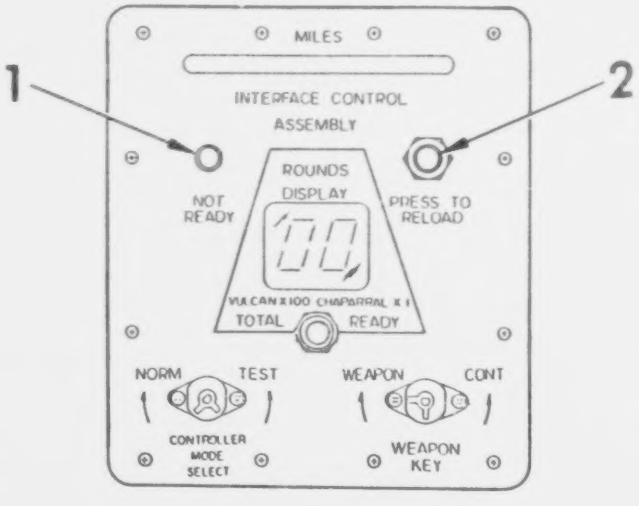
Turn SYSTEM POWER ON. Allow two minutes warmup.

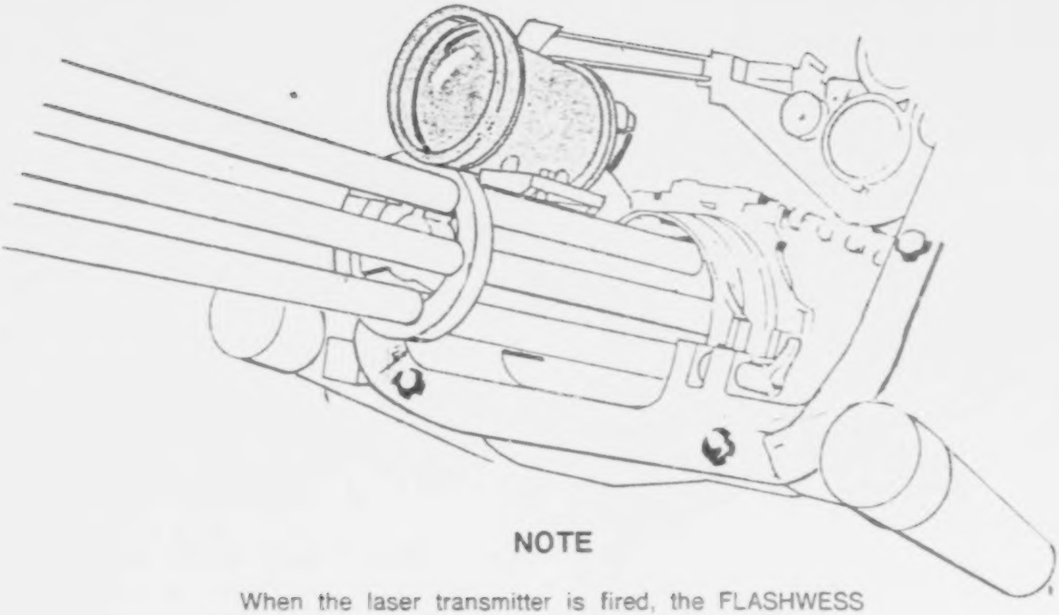
NOTE

In RADAR MODE, all three laser tubes fire when locked on target. In MANUAL MODE, only center laser tube fires.

During laser transmitter firing (MANUAL or RADAR mode), when all ammunition rounds have been expended (ROUNDS DISPLAY is 0) the ICA NOT READY indicator (1) will light.

To reload laser transmitter, press PRESS TO RELOAD pushbutton switch (2) on ICA. 100 rounds may be reloaded at a time with a 1-minute delay for VULCAN SP. During reloading ICA NOT READY indicator will light.

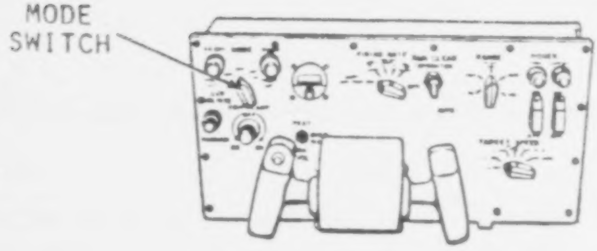

1
2
MILES
INTERFACE CONTROL ASSEMBLY
NOT READY
PRESS TO RELOAD
ROUNDS DISPLAY
00
VULCAN X 100 CHAPARRAL X 1
TOTAL
READY
NORM
TEST
WEAPON
CONT
CONTROLLER MODE SELECT
WEAPON KEY



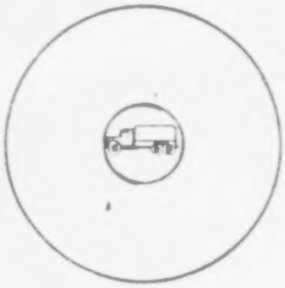
NOTE

When the laser transmitter is fired, the FLASHWESS lamp will flash approximately 120 flashes per minute.

During MILES exercises the GROUND mode should not be used. Laser firing in the GROUND mode will be inaccurate. MANUAL mode should be used for ground targets during MILES exercises.



VULCAN CONTROL ASSEMBLY

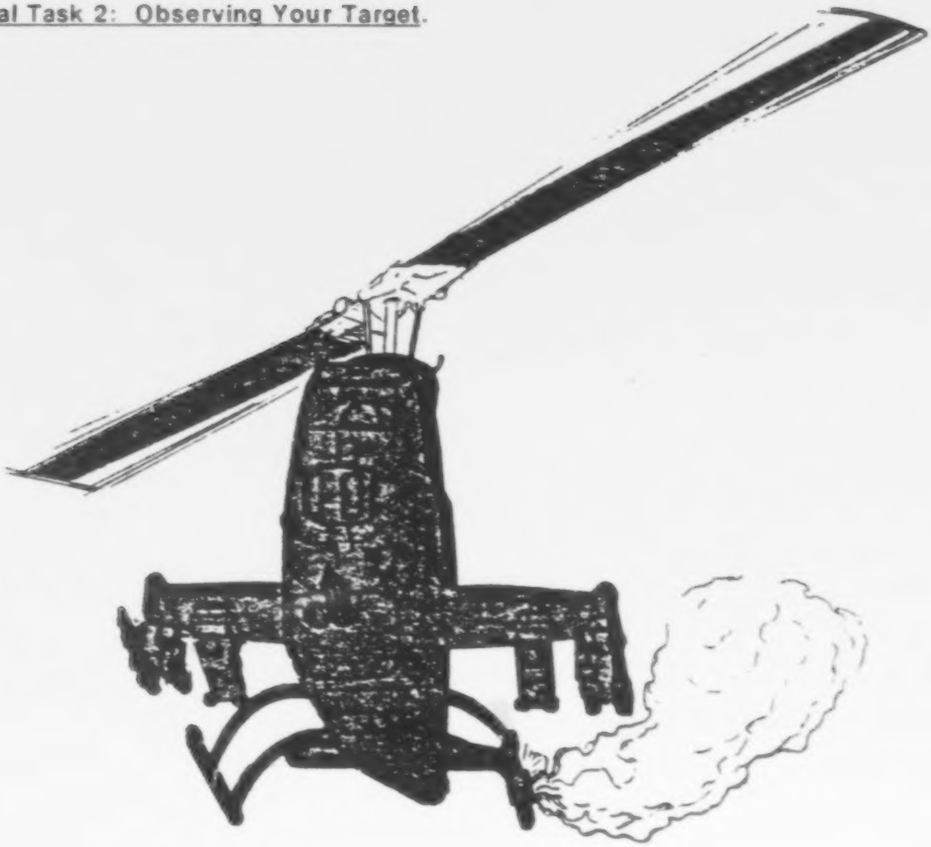


GROUND TARGET

MILES-equipped VULCAN can be fired without firing FLASHWESS. This is normally only necessary during system testing and/or troubleshooting. The Controller must set the system for this "dry fire" or test firing mode.

best copy available

Operational Task 2: Observing Your Target.



The effect of your MILES-equipped weapon fire can be evaluated by observing your target during training exercises.

If detectors are "HIT" by laser fire, strobe lights on vehicles and aircraft will flash and personnel MWLDs alarms will sound. Usually, you will not be close enough to hear alarms. When "KILLED," smoke grenades mounted on some aircraft will discharge yellow smoke.

If a vehicle or aircraft is "HIT" but not "KILLED," the strobe alarm flashes four to six times.

If a vehicle or aircraft is "NEAR MISSED," the strobe alarm flashes twice.

If you "KILL" personnel, soldiers remove yellow keys from laser transmitters and insert them in their MWLDs to turn off buzzers.

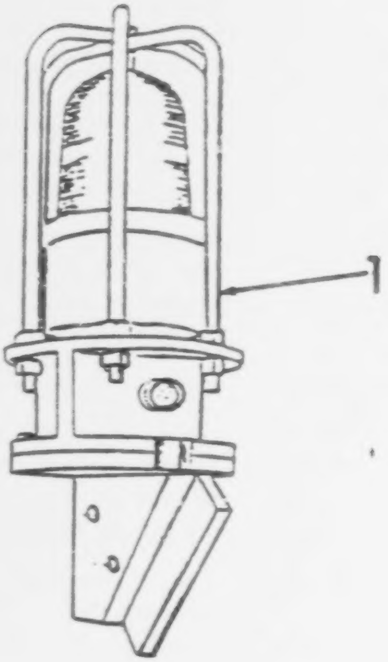
Operational Task 3: Recognizing Enemy Fire.

1. If you are hit by laser fire, CVKI light (1) will flash. A brief alarm (2 CVKI flashes) means a "NEAR MISS." Repeated 4 to 6 CVKI flashes mean a "HIT." Continuous CVKI flashing indicates a "KILL."

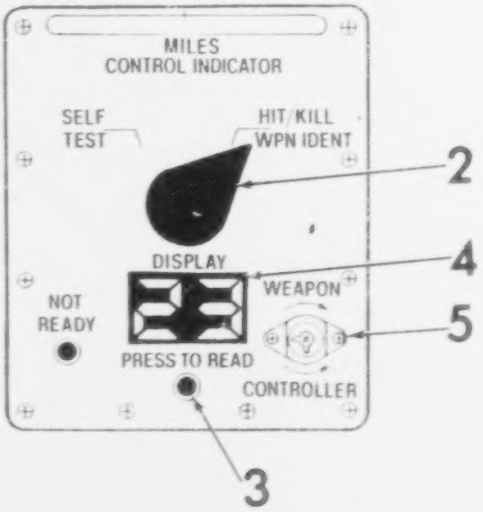
2. To determine what kind of weapon has fired on you, turn the switch (2) on the Control Indicator Assembly to HIT/KILL position.

3. Press display button (3).

4. The display (4) will show a number. Use the chart below to match number on display with type of weapon firing on you.



Display Number	Weapon
00	Controller Gun
07	TOW or Shillelagh
08	DRAGON
12	105 mm
13	152 mm
14	2.75 inch Rocket
15	VIPER
16	120 mm
22	25 mm
23	VULCAN
24	M2, M85
99	SELF-KILL


MILES
CONTROL INDICATOR
SELF TEST
HIT/KILL
WPN IDENT
2
DISPLAY
4
NOT READY
WEAPON
5
PRESS TO READ
CONTROLLER
3

5. "SELF-KILL" results when Weapon (Orange) Key is put in the Control Indicator Assembly receptacle (5) when you have not been "KILLED" by the laser fire. When the key is inserted and turned to WEAPON position, the number 99 will show, and the CVKI light will flash continuously. You must then call the Controller to reset your system.

Operational Task 3: Recognizing Enemy Fire (Cont).

WARNING

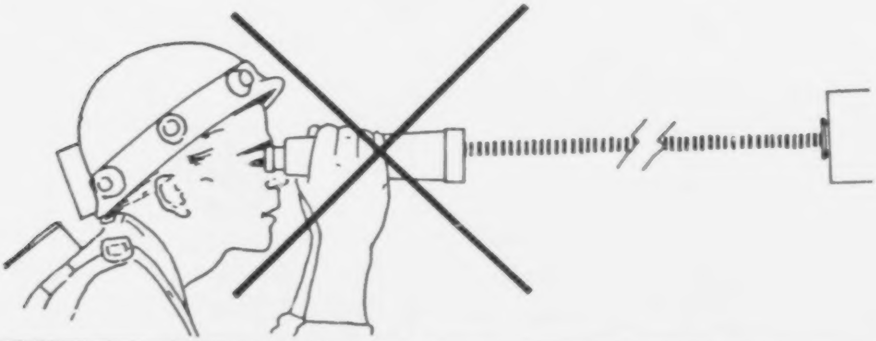
Although the laser light emitted by MILES laser transmitters is considered eye safe by the Bureau of Radiological Health, suitable precautions must be taken to avoid possible eye damage from overexposure to this radiated energy. Precautionary measures include the following:

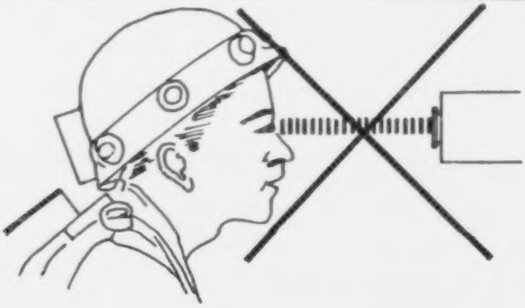
Avoid viewing the laser emitter at close range (less than 12 meters). Increasing the eye-to-laser distance greatly reduces the risks of overexposure.

Avoid viewing the laser emitter directly along the **optical axis** of radiated beam.

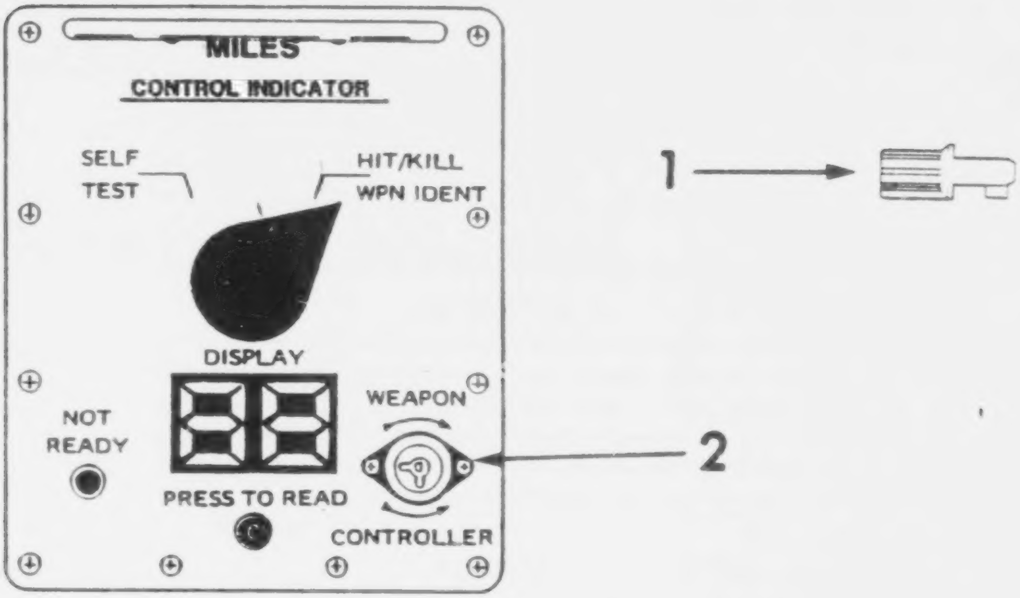
Especially avoid viewing the laser emitter through magnifying optics at engagement ranges of less than 75 **meters** for STINGER, VULCAN, and TOW, and 110 **meters** for the CHAPARRAL.

Avoid allowing personnel with optics of **higher transmission or magnifying power than normal tank optics** to view STINGER, VULCAN, or TOW within 150 **meters** or the CHAPARRAL within 330 **meters**.





Operational Task 4: Resetting After a "KILL".


MILES
CONTROL INDICATOR
SELF TEST
HIT/KILL
WPN IDENT
DISPLAY
NOT READY
PRESS TO READ
WEAPON
CONTROLLER
1
2

If your vehicle is "KILLED," the laser transmitter is automatically turned off.

To silence your intercom alarm after a "KILL" use the Weapon (Orange) Key (1).

Insert the weapon key in the Control Indicator Assembly receptacle (2) and turn off the intercom alarm. IF YOU REMOVE KEY FROM RECEPTACLE, THE ALARM WILL BEGIN AGAIN. The CVKI light continues to flash. It can be turned off only by the Controller.

To reset, remove Weapon Key. Alarm will sound. Ask the Controller to turn off your intercom alarm and CVKI light. This resets Control Indicator Assembly.

The Controller will determine when to reset your system.

POSTOPERATIONAL TASKS - LIST

Task	Title	Page
1.	Cable Postoperational Tasks	2-82
2.	Outside and Inside Postoperational Tasks	2-82
3.	Transit Case Packing Instructions	2-83
4.	Return All Equipment	2-83

NOTE

If you need additional information on completing a Postoperational Task, turn to referenced section. Postoperational Task will be done in reverse order of referenced section.

WARNING

If task requires Vehicle and/or MILES Equipment Power to be turned ON, ensure Vehicle and/or MILES Equipment Power is turned OFF upon completion of task. Failure to comply may result in Personal Injury or Equipment Damage.

Postoperational Task 1: Cable Postoperational Task.

Disconnect and remove VULCAN Cable. See Outside Cabling Tasks 4, 5, 6, 7, and 8, and Inside Cabling Task 4.

Disconnect and remove Cable Extension Housing. See Inside Cabling Tasks 2 and 3.

Disconnect and remove CVKI Cable Assembly. See Outside Cabling Tasks 2 and 3, and Inside Cabling Tasks 2 and 3.

NOTE

Reconnect vehicle plug W3 to connector J5 on power distribution box.

Inspect cable assemblies.

Postoperational Task 2: Outside and Inside Postoperational Task.

Remove and inspect ICA. See Outside Installation Tasks 16 and 17.

Remove and inspect Battery Boxes. See Outside Installation Tasks 18 and 19, and Inside Tasks 2 and 3.

Remove and inspect CIA. See Inside Installation Tasks 4 and 5.

Remove and inspect Flashwess device. See Outside Installation Tasks 12 and 13.

Remove and inspect Laser Transmitter and Modulator. Remove and inspect MILES screws, spacer and mount. See Outside Installation Tasks 14 and 15.

Remove and inspect CVKI. See Outside Installation Tasks 10 and 11.

NOTE

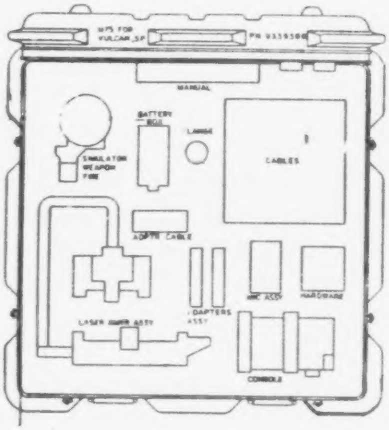
Reinstall mounting bracket on CVKI before returning assembly to MILES M113 APC transit case.

Remove Detector Belts. See Outside Installation Tasks 5, 6, 7, 8 and 9.

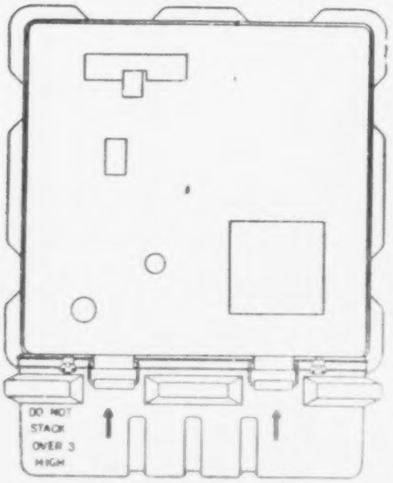
WARNING

Reconnect motor connector W3P3. Ensure connector is safety laced.

Postoperational Task 3: Transit Case Packing Instructions.


MTS FOR
VULCAN SP
MANUAL
BATTERY BOX
SIMULATOR WEAPON FIRE
CABLES
ADPTR CABLE
ADAPTERS ASSY
HARDWARE
LASER ASSY
CONSOLE

Place MILES AGES/AD VULCAN equipment in storage locations as marked in the transit case.


DO NOT
STACK
OVER 3
HIGH

Postoperational Task 4: Return All Equipment.

Return all equipment to your NCOIC.
Return MILES VULCAN transit case.
Return MILES M113 APC transit case.

SECTION IV. OPERATION UNDER UNUSUAL CONDITIONS

Operational procedures for the MILES equipment have the same limitations as the Self-Propelled VULCAN (see TM 9-2350-300-10).

CHAPTER 3

MAINTENANCE INSTRUCTIONS

SECTION I. LUBRICATION INSTRUCTIONS

MILES equipment for the VULCAN, Self-Propelled, requires no operator lubrication.

SECTION II. TROUBLESHOOTING PROCEDURES

Tables 3-1 and 3-2 list the common malfunctions which you may find during the operation or maintenance of the MILES simulator system for the VULCAN, Self-Propelled, or its components. You should perform the Tests/Inspections and Corrective Actions in the order listed.

This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Troubleshooting of the VULCAN, Self-Propelled requires the assistance of a Controller, a MILES System Test Set (MSTS) (Section II, Appendix C), and Controller Gun (Section II, Appendix C). The Controller will obtain and provide this equipment. A Man Worn Laser Detector (MWLD) torso harness supplied in the M113 APC MILES system is also required. (Section II, Appendix C). The VULCAN crew shall assist the Controller. (This equipment is shown on page 3-2.1)

WARNING

Do not disconnect cables from power distribution box or sight current generator when VULCAN system Power is ON. Electrical shock could occur.

NOTE

If no MILES System Test Set (MSTS) is available, refer to Table 3-1, page 3-3. If an MSTS is available, go to Table 3-2, page 3-15.

SYMPTOM INDEX
(NO TEST SET)

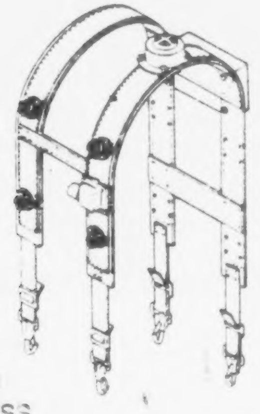
Unit	Symptom	Troubleshooting Procedure Page
1. Interface Control Assembly (ICA)	(1) Display Is Blank	3-3
	(2) Incorrect ROUNDS DISPLAY Indication	3-4
	(3) ROUNDS DISPLAY Indication Does Not Change	3-4
	(4) Firing Indicators Do Not Light	3-4
	(5) ICA Cannot Be Triggered	3-5
	(6) Rounds Cannot Be Reloaded	3-5

SYMPTOM INDEX (Cont)

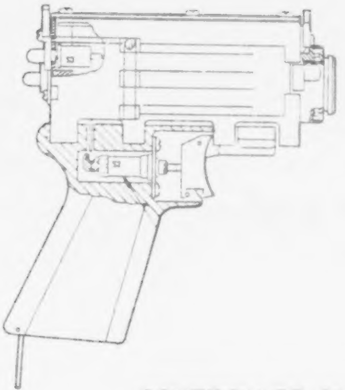
Unit	Symptom	Troubleshooting Procedure Page
2. VULCAN Transmitter Test	(1) One Laser Tube Inoperative	3-6
	(2) Center And One Outside Laser Tube Inoperative	3-6
	(3) All Laser Tubes Inoperative	3-6
	(4) Both Outside Laser Tubes Inoperative	3-7
	(5) Outside Laser Tubes Operate When MANUAL Firing Mode Selected	3-8
3. FLASHWESS Test	(1) FLASHWESS Inoperative	3-9
4. Control Indicator Assembly	(1) Display Is Blank	3-10
	(2) Display Does Not Indicate 88	3-11
	(3) Weapon Identification Code Is Not Displayed	3-11
	(4) NOT READY Light Does Not Light	3-11
5. Vehicle Detector Belts	(1) One Detector Belt Faulty	3-12
	(2) All Detector Belts Faulty	3-12
6. Combat Vehicle Kill Indicator	(1) CVKI Fails To Operate	3-13
7. Intercom	(1) Intercom Fails To Operate	3-14

(Using MILES System Test Set - MSTS)

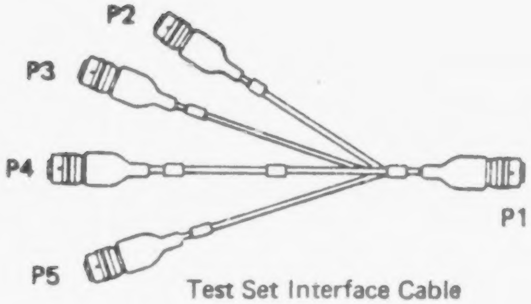
Unit	Symptom	Troubleshooting Procedure Page
1. Interface Control Assembly (ICA)	(1) Display Is Blank	3-15
	(2) Incorrect ROUNDS DISPLAY Indication	3-17
	(3) ROUNDS DISPLAY Indication Does Not Change	3-19
	(4) Firing Indicators Do Not Light	3-19
	(5) ICA Cannot Be Triggered In Either LO-NO or HIGH BURST LIMIT Rate	3-19
	(5.1) ICA Cannot Be Triggered In Either LO-NO or HIGH BURST LIMIT Rate - Firing Indication Correct	3-21
	(6) ICA Cannot Be Triggered In The HIGH BURST LIMIT Rate	3-22
	(7) ICA Cannot Be Triggered In The LO-NO BURST Rate	3-23
	(8) Rounds Cannot Be Reloaded	3-24
2. VULCAN Transmitter Test	(1) One Laser Tube Inoperative	3-25
	(2) Center And One Outside Laser Tube Inoperative	3-25
	(3) All Laser Tubes Inoperative	3-25
	(4) Both Outside Laser Tubes Inoperative	3-28
	(5) Outside Laser Tubes Operate When MANUAL Firing Mode Selected	3-30
3. FLASHWESS Test	(1) FLASHWESS Inoperative	3-32
	(1.1) FLASHWESS Inoperative - No Indication Flash	3-33
	(1.2) FLASHWESS Inoperative - Detection Cable	3-34
	(2) FLASHWESS Inoperative - HI-BURST LIMIT Rate	3-35
	(3) FLASHWESS Inoperative - LO-NO BURST LIMIT Rate	3-36
4. Control Indicator Assembly	(1) Display Is Blank	3-38
	(1.1) Display Is Blank - Batteries/Belts/CVKI	3-41
	(2) Display Does Not Indicate 88	3-42
	(3) Weapon Identification Code Is Not Displayed	3-44
	(4) NOT READY Light Does Not Light	3-44
5. Vehicle Detector Belts	(1) One Detector Belt Faulty	3-44
	(2) All Detector Belts Faulty	3-45
	(2.1) All Detector Belts Faulty , - Controller Gun Test	3-47
6. Combat Vehicle Kill Indicator	(1) CVKI Fails To Operate	3-48
	(1.1) CVKI Fails To Operate - Voltage Check	3-50
7. Intercom	(1) Intercom Fails To Operate	3-52



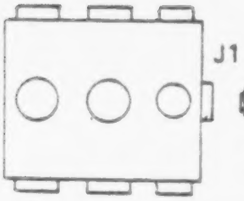
TORSO HARNESS

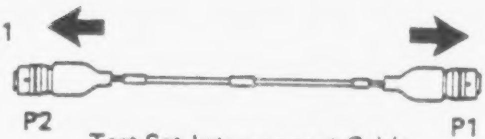


CONTROLLER GUN


P2
P3
P4
P1
P5

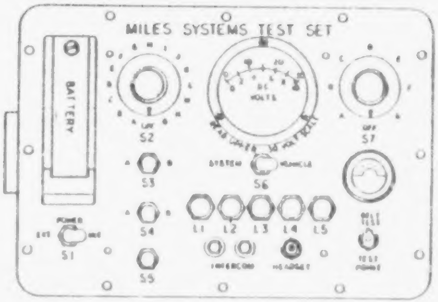
Test Set Interface Cable



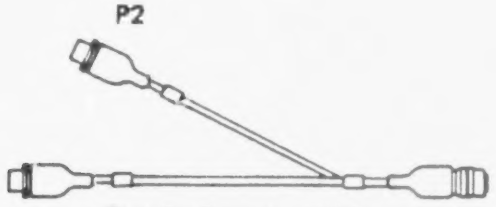


Test Set Interconnect Cable

Test Set Junction Box


MILES SYSTEMS TEST SET
BATTERY
DC VOLTS
S2
S3
S4
S5
S6
S7
SYSTEM
VEHICLE
POWER
S1
L1
L2
L3
L4
L5
INTERCOM
HEADSET
TEST POINT

MILES SYSTEM TEST SET



Test Set Detector Cable

TROUBLESHOOTING EQUIPMENT

Table 3-1. Troubleshooting - No Test Set

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

1. INTERFACE CONTROL ASSEMBLY (ICA)

(1) Display Is Blank

Disconnect connector P1 from ICA, wait one second and reconnect.

Return system to service if ICA is now operable.

Disconnect battery box from System Cable, connector P6. Pause for one second and reconnect. Check display reading.

Return system to service if display shows 00.

If display is still blank, remove Interface Control Assembly (ICA) and replace with unit known to be operable. Retest system.

Return system to service if display shows 00.

If display is still blank, reinstall former ICA. Remove Vulcan transmitter assembly and replace with unit known to be operable. Retest system.

Return system to service if display shows 00.

If display is still blank, reinstall former transmitter. Remove System Cable Assembly and replace with cable assembly known to be operable. Retest system.

Return system to service if display shows 00.

If display is still blank, reinstall former System Cable Assembly Remove battery box and replace with unit known to be operable. Retest system.

Return system to service if display shows 00.

If display is still blank, reinstall former battery box and install new batteries. Return system to service.

Table 3-1. Troubleshooting – No Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

1. INTERFACE CONTROL ASSEMBLY (ICA) (CONT)

(2) Incorrect ROUNDS DISPLAY Indication

Insert the Controller (Green) Key into the WEAPON key receptacle on the ICA. Turn to the CONTROLLER position. Turn back and remove key.

Check ROUNDS DISPLAY indication for Total Rounds = 20
Ready Rounds = 11

If ROUNDS DISPLAY indications are correct, return system to service.

If ROUNDS DISPLAY indication is incorrect, remove Interface Control Assembly (ICA) and replace with unit known to be operable. Retest system.

If ROUNDS DISPLAY indication is correct, return system to service.

If ROUNDS DISPLAY indication is still incorrect, reinstall former ICA. Install new batteries and return system to service.

(3) ROUNDS DISPLAY Indication Does Not Change

Failure of ROUNDS DISPLAY indication to change indicates a problem with Interface Control Assembly (ICA).

Replace defective ICA and return system to service.

(4) Firing Indicators Do Not Light

Failure of the Firing Indicators (decimal points on the display) to light indicates a problem with Interface Control Assembly (ICA).

Replace defective ICA and return system to service.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

(5) ICA Cannot Be Triggered

Remove the Interface Control Assembly (ICA) and replace with unit known to be operable. Retest system.

If ICA can be triggered, return system to service.

If ICA cannot be triggered, reinstall former ICA. Remove System Cable Assembly and replace with cable assembly known to be operable. Retest system.

If ICA can be triggered, return system to service.

If ICA cannot be triggered, reinstall former System Cable Assembly. Remove FLASHWESS Assembly and replace with unit known to be operable. Retest system.

If ICA can be triggered, return system to service.

If ICA cannot be triggered, reinstall former FLASHWESS Assembly. Inspect VULCAN Weapon System for malfunctions. See TM 9-1005-286-10.

Return system to service.

(6) Rounds Cannot Be Reloaded

Failure of READY ROUNDS display indication to increase 30 seconds after PRESS TO RELOAD pushbutton is depressed indicates a problem with the Interface Control Assembly (ICA).

Replace defective ICA and return system to service.

Table 3-1. Troubleshooting – No Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

2. VULCAN TRANSMITTER TEST

(1) One Laser Tube Inoperative

One laser tube inoperative indicates a problem with the Transmitter Assembly.

Replace the defective Transmitter Assembly and return system to service.

(2) Center And One Outside Laser Tube Inoperative

The center laser tube and one outside laser tube inoperative indicates a problem with the Transmitter Assembly.

Replace defective Transmitter Assembly and return system to service.

(3) All Laser Tubes Inoperative

Disconnect connector P8 from Modulator Transmitter Assembly. Wait one second and reconnect.

Return system to service if transmitter is operable.

Remove Transmitter Assembly and replace with unit known to be operable. Retest system.

Return system to service if all laser tubes are now operational.

If all laser tubes are still inoperative, reinstall former transmitter. Replace Interface Control Assembly (ICA) with a unit known to be operable. Retest system.

Return system to service if all laser tubes are now operational.

If all laser tubes are still inoperative, reinstall former ICA. Replace System Cable Assembly with a cable assembly known to be operable. Retest system.

Return system to service.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

(4) Both Outside Laser Tubes Inoperative

Cover the center laser tube with a helmet, hand or other opaque material.

Place VULCAN system in MANUAL mode.

Insert Controller (Green) Key in CONTROLLER TEST key receptacle on modulator. Turn key counterclockwise to select TEST mode.

Place a MWLD harness with a detector directly in front of the transmitter.

Select LO-NO firing rate. Verify sufficient rounds remain for test. Trigger the VULCAN Weapon System. Verify that the MWLD detector harness responds with either "KILL" or a "NEAR MISS" alarms.

If MWLD alarm responds, replace defective Transmitter Assembly and return system to service.

Remove the Interface Control Assembly (ICA) and replace with a unit known to be operable. Retest system.

Return system to service if outside tubes are now operational.

If outside tubes are still inoperative, reinstall former ICA. Remove System Cable Assembly and replace with cable assembly known to be operable. Retest system.

Return system to service if outside tubes are now operational.

If outside tubes are still inoperative, reinstall former System Cable Assembly. Repair all Vulcan Weapon System malfunctions. See TM 9-1005-286-10.

Return system to service.

Table 3-1. Troubleshooting - No Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

2. VULCAN TRANSMITTER TEST (CONT)

(5) Outside Laser Tubes Operate When MANUAL Firing Mode Selected

Remove VULCAN Transmitter Assembly and replace with a unit known to be operable. Retest system.

Return system to service if outside tubes are now operational.

If tubes are still not operational, reinstall former Transmitter Assembly. Remove Interface Control Assembly (ICA) and replace with unit known to be operable. Retest system.

Return system to service if outside tubes are now operational.

If outside tubes are still not operational, reinstall former ICA. Remove System Cable Assembly and replace with cable assembly known to be operable. Retest system.

Return system to service if outside tubes are now operational.

If tubes are still not operational, reinstall former System Cable Assembly. Repair all VULCAN Weapon System malfunctions. See TM 9-1005-286-10.

Return system to service.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

3. FLASHWESS TEST

(1) FLASHWESS Inoperative

Ensure that ICA is in NORM mode.

If FLASHWESS is still inoperative, disconnect connector P5 from FLASHWESS. Wait one second and reconnect.

Return system to service if FLASHWESS is operable.

Replace FLASHWESS assembly with unit known to be operable. Retest system.

Return system to service if FLASHWESS is now operational.

If FLASHWESS is still inoperative, reinstall former FLASHWESS assembly. Remove Interface Control Assembly (ICA) and replace with unit known to be operable. Retest system.

Return system to service if FLASHWESS is now operational.

If FLASHWESS is still inoperative, reinstall former ICA. Remove System Cable Assembly and replace with cable assembly known to be operable. Retest system.

Return system to service if FLASHWESS is now operational.

If FLASHWESS is still inoperative, reinstall former System Cable Assembly. Repair all VULCAN Weapon System malfunctions. See TM 9-1005-286-10.

Return system to service.

Table 3-1. Troubleshooting – No Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

4. CONTROL INDICATOR ASSEMBLY (CIA)

(1) Display Is Blank

Disconnect connector P1 from CIA. Wait one second and reconnect.

Return system to service if CIA is operable.

Disconnect the CVKI Cable, connection P11, from the battery box. Pause one second and reconnect.

Check CIA display.

If display reads 00, return system to service.

If display is still blank, remove Control Indicator Assembly (CIA) and replace with unit known to be operable. Retest system.

If display reads 00, return system to service.

If display is still blank, reinstall former CIA. Remove System Cable Assembly and replace with cable assembly known to be operable. Retest system.

If display reads 00, return system to service.

If display is still blank, reinstall former System Cable Assembly. Remove CVKI assembly and replace with unit known to be operable. Retest system.

If display reads 00, return system to service.

If display is still blank, reinstall former CVKI assembly. Remove a detector belt and replace with a unit known to be operable. Retest system.

If display reads 00, return system to service.

If display is still blank, reinstall detector belt. Remove battery box and replace with unit known to be operable. Retest system.

If display reads 00, return system to service.

If display is still blank, reinstall former battery box with NEW batteries and return system to service.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

(2) Display Does Not Indicate 88

Insert a Controller (Green) Key into the WEAPON key receptacle on the CIA. Turn counterclockwise to the CONTROLLER position. Turn back and remove key.

Turn CIA Console Switch to HIT/KILL. Then turn to SELF TEST. Check CIA display.

If display reads 88, return system to service.

If display does not show 88, remove Control Indicator Assembly (CIA) and replace with unit known to be operable. Retest.

If display indicates 88, return system to service.

If display does not indicate 88, install NEW batteries in battery box and return system to service.

(3) Weapon Identification Code is Not Displayed

Failure of the CIA to display a Weapon Identification Code indicates a problem with the CIA.

Replace defective CIA and return system to service.

(4) NOT READY Light Does Not Light

Failure of the NOT READY light to light when a KILL response is indicated by the CVKI indicates a problem with the CIA.

Replace defective CIA and return system to service.

Table 3-1. Troubleshooting – No Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

5. VEHICLE DETECTOR BELTS

(1) One Detector Belt Faulty

Remove the suspected faulty detector belt and replace with a belt known to be operational. Retest.

If system responds correctly, return to service.

If belt still gives faulty indication, reinstall former belt. Remove defective Detection Belt Assembly and replace with unit known to be operable.

Return system to service.

(2) All Detector Belts Faulty

Remove one of suspected faulty detector belts and replace with unit known to be operable. Retest.

If system now responds correctly, return to service.

If belts still give faulty indication, replace former belt and repeat test with each of two remaining belts.

If system now responds correctly, return to service.

If belts still give faulty indication, replace former belts. Remove Detector Cable Assembly and replace with unit known to be operable. Retest.

If system now responds correctly, return to service.

If belts still give faulty indication, reinstall former Detection Cable Assembly. Remove defective Control Indicator Assembly (CIA) and replace with unit known to be operable.

Return system to service.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

6. COMBAT VEHICLE KILL INDICATOR (CVKI)

(1) CVKI Fails To Operate

Check that the gun system power switch is ON.

Disconnect connector P5 from CVKI. Wait one second and reconnect.

Return system to service if CVKI is operable.

If CVKI is still inoperative, remove CVKI and replace with unit known to be operable. Retest system.

If CVKI now operates, return system to service.

If CVKI is still inoperative, reinstall former CVKI. Remove the Control Indicator Assembly (CIA) and replace with a unit known to be operable. Perform CIA self test. If CIA is inoperative, perform CIA troubleshooting, page 3-10. If CIA operates, retest CVKI.

If CVKI now operates, return system to service.

If CVKI is still inoperative, reinstall former CIA. Remove the Detection Cable Assembly and replace with a unit known to be operable. Retest system.

If CVKI now operates, return system to service.

If CVKI is still inoperative, reinstall former Detection Cable Assembly. Repair all VULCAN Weapon System malfunctions. See TM 9-1005-286-10.

Return system to service if CVKI is operable.

Table 3-1. Troubleshooting – No Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

7. INTERCOM

(1) Intercom Fails To Operate

Disconnect CVKI cable, connector P1 from the CIA. Wait one second and reconnect.

Return to service if Intercom is operable.

Remove CIA and replace with a unit known to be operable. Retest.

If Intercom now operates, return system to service.

If Intercom is still inoperative, reinstall CIA. Remove CVKI Cable Assembly and replace with a cable assembly known to be operable. Retest.

If Intercom now operates, return system to service.

Table 3-2. Troubleshooting – MILES System Test Set

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

CAUTION

Do not misuse equipment.

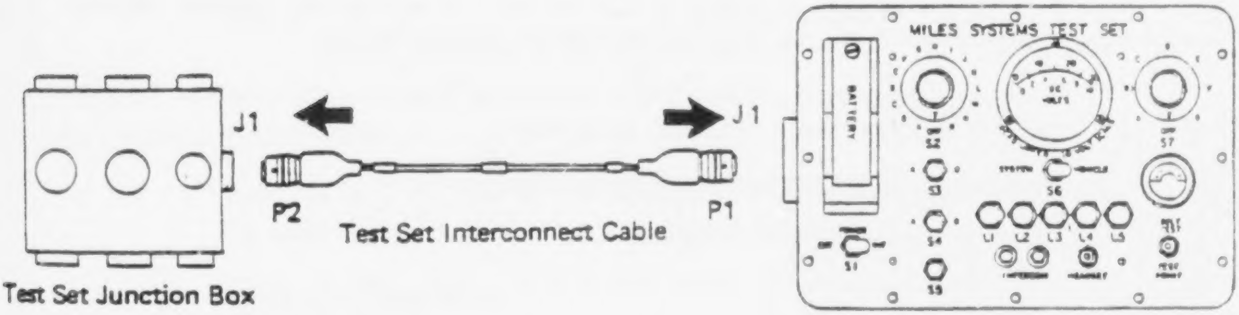
1. INTERFACE CONTROL ASSEMBLY (ICA)

(1) Display Is Blank

Disconnect battery box from System Cable, connector P6. Pause for one second and reconnect. Check display reading.

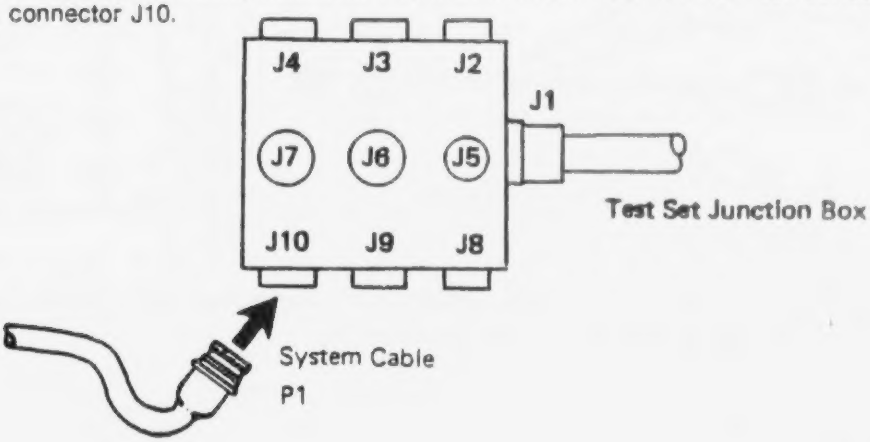
Return system to service if display shows 00.

If display is still blank, connect Test Set Interconnect Cable, connector P1, to test set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.



MILES SYSTEMS TEST SET
BATTERY
S2
S7
S3
S6
S4
L1
L2
L3
L4
L5
S1
S5
J1
J1
P2
P1
Test Set Interconnect Cable
Test Set Junction Box

Disconnect System Cable, connector P1, from the ICA. Connect to Test Set Junction Box, connector J10.



J4
J3
J2
J1
J7
J6
J5
J10
J9
J8
Test Set Junction Box
System Cable
P1

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

1. INTERFACE CONTROL ASSEMBLY (ICA) (CONT)

(1) Display Is Blank (Cont)

Place test set switch S1 to EXT position.

Place test set switch S6 to the SYSTEM position.

Read voltage on voltmeter.

If voltage reading is between 8.5 to 13 volts, replace defective ICA and return system to service.

If voltage reading is less than 8.5 volts, disconnect System Cable, connector P8, from VULCAN Transmitter Assembly.

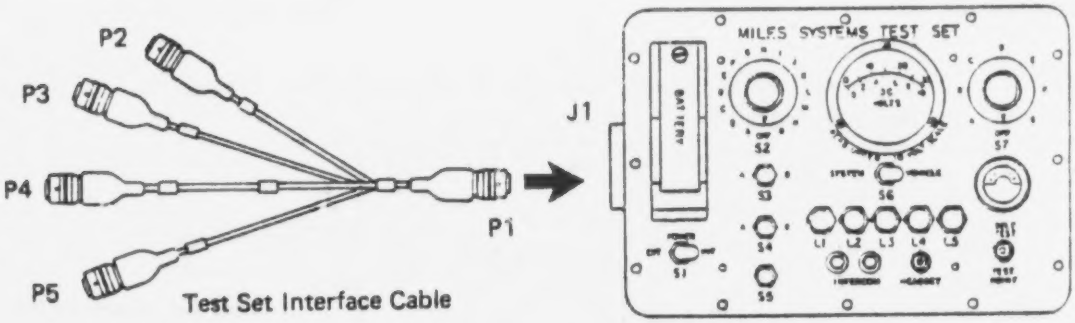
Retest voltage on voltmeter.

If voltage reading is now between 8.5 and 13 volts, replace defective Transmitter Assembly and return system to service.

If voltage reading is less than 8.5 volts, disconnect System Cable, connector P1, from Test Set Interface Cable. Reconnect to the ICA.

Disconnect Test Set Interconnect Cable from test set.

Connect Test Set Interface Cable, connector P1, to test set, connector J1.



Disconnect System Cable, connector P6, from battery box. Connect battery box to Test Set jumper Interface Cable, connector P4.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Place Test Set switch S1 to EXT position.

Place Test Set switch S6 to the SYSTEM position.

Read voltage on voltmeter.

If voltage reading is 8.5 to 13 volts, replace defective System Cable and return system to service.

If voltage reading is less than 8.5 volts, install two new 6-volt batteries in the battery box.

Retest voltage on voltmeter.

If voltage reading is 8.5 to 13 volts, discard old batteries and return system to service.

If voltage reading is still less than 8.5 volts, replace defective battery box and return system to service.

(2) Incorrect ROUNDS DISPLAY Indication

Insert the Controller (Green) Key into the WEAPON key receptacle on the ICA. Turn to the CONTROLLER position. Turn back and remove key.

Check ROUNDS DISPLAY indication for TOTAL Rounds = 20
READY Rounds = 11

If ROUNDS DISPLAY indications are correct, return system to service.

Table 3-2. Troubleshooting – MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

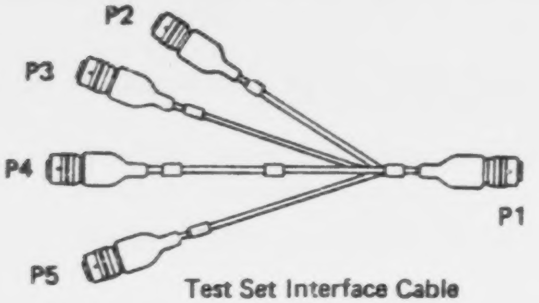
CORRECTIVE ACTION

---

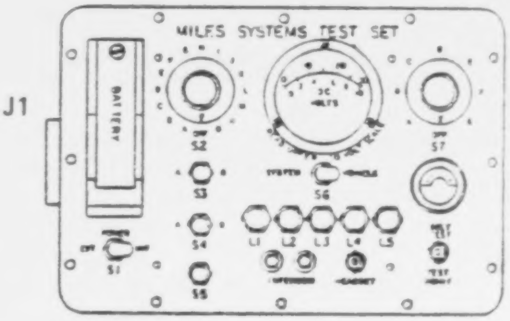
1. INTERFACE CONTROL ASSEMBLY (ICA) (CONT)

(2) Incorrect ROUNDS DISPLAY Indication (Cont)

If ROUNDS DISPLAY indications are incorrect, connect Test Set Interface Cable, connector P1, to test set, connector J1.


P2
P3
P4
P5
P1

Test Set Interface Cable


J1
MILES SYSTEMS TEST SET
BATTERY
S1
S2
S3
S4
S5
S6
S7
SYSTEM
VEHICLE
L1
L2
L3
L4
L5

Disconnect battery box from System Cable, connector P6. Connect battery box to Test Set Interface Cable, connector P4.

Place test set switch S6 to the SYSTEM position.

Place test set switch S1 to EXT position.

Read voltage on voltmeter.

If voltage reading is 8.5 to 13 volts, replace defective ICA and return system to service.

If voltage reading is less than 8.5 volts, discard old batteries. Install two new batteries and return system to service.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

(3) ROUNDS DISPLAY Indication Does Not Change

Failure of ROUNDS DISPLAY indication to change indicates a problem with Interface Control Assembly (ICA).

Replace defective ICA and return system to service.

(4) Firing Indicators Do Not Light

Failure of the Firing Indicators (decimal points on the display) to light indicates a problem with Interface Control Assembly (ICA).

Replace defective ICA and return system to service.

(5) ICA Cannot Be Triggered In Either LO-NO Or HI-BURST LIMIT

Select TEST mode by inserting the Controller (Green) Key into CONTROLLER MODE SELECT key receptacle on the ICA. Rotate key counterclockwise, then remove key.

Select MANUAL mode and 100-ROUND BURST firing rate on VULCAN Control Assembly. Verify Weapon (Orange) Key is in WEAPON key receptacle in WEAPON position on ICA. Verify sufficient laser rounds remain for test. Trigger the VULCAN firing system.

If Firing Indicators (decimal points on ICA display) appear, go to (5.1) ICA Cannot Be Triggered In Either LO-NO Or HI-BURST LIMIT Rate – Firing Indications Correct (page 3-21).

If Firing Indicators (decimal points on ICA display) do not appear, select LO-NO firing rate on VULCAN Control Assembly. Verify sufficient laser rounds remain for test. Trigger VULCAN Weapon System. Recheck display.

If Firing Indicators now appear, replace defective ICA and return system to service.

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

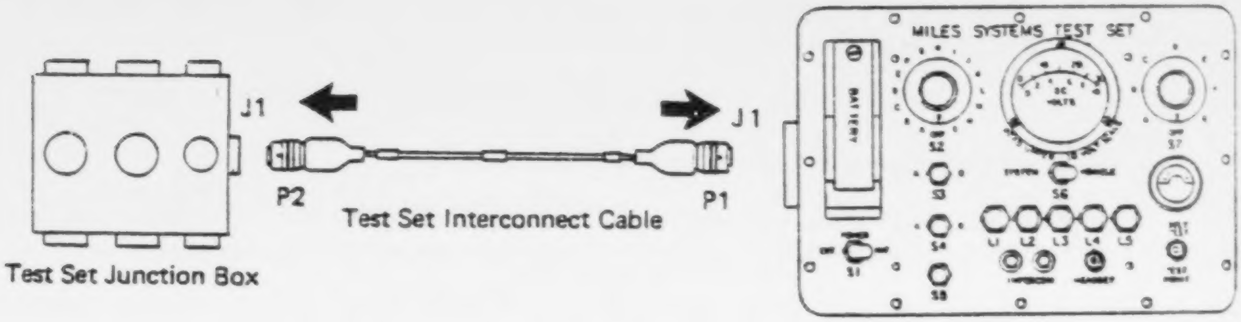
CORRECTIVE ACTION

---

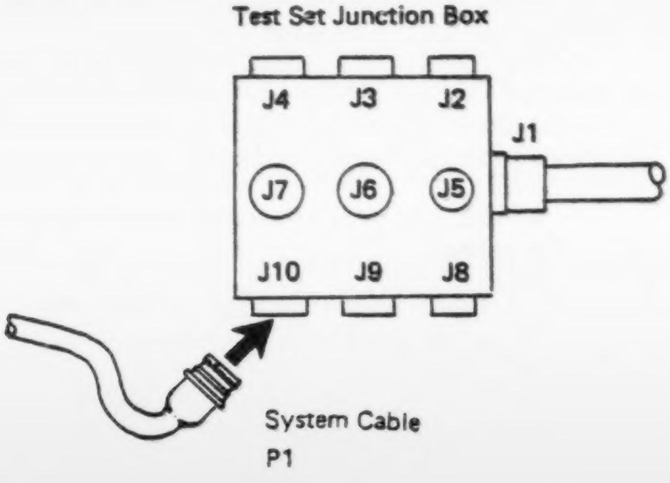
1. INTERFACE CONTROL ASSEMBLY (ICA) (CONT)

(5) ICA Cannot Be Triggered In Either LO-NO Or HI-BURST LIMIT (Cont)

If Firing Indicators still do not appear, connect the Test Set Interconnect Cable, connector P1, to the test set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.


J1
J1
P2
P1
Test Set Interconnect Cable
Test Set Junction Box
MILES SYSTEMS TEST SET
BATTERY
S1
S2
S3
S4
S5
S6
S7
L1
L2
L3
L4
L5

Disconnect System Cable, connector P1, from the ICA and connect to connector J10 on the Test Set Junction Box.


Test Set Junction Box
J4
J3
J2
J1
J7
J6
J5
J10
J9
J8
System Cable
P1

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Place test set switch S6 to the VEHICLE position.

Place test set switch S1 to EXT.

Place test set switch S2 to position K.

Select a 100-ROUND BURST firing rate. Verify sufficient laser rounds ramain for testing. Trigger VULCAN Weapon System. Read trigger voltage on test set voltmeter.

If voltage reading is 18 to 30 volts, replace defective ICA and return system to service.

If voltage reading is less than 18 volts, VULCAN Weapon System is defective. Correct all malfunctions (see TM 9-2350-300-10) and return system to service.

(5.1) ICA Cannot Be Triggered In Either LO-NO Or HI-BURST LIMIT Rate - Firing Indications Correct

Select NORM MODE by inserting the Controller (Green) Key into CONTROLLER MODE SELECT key receptacle on the ICA Rotate the Controller key clockwise, then remove key.

Exchange FLASHWESS Assembly for an assembly known to be operational. Verify sufficient laser rounds remain for testing.

Select a 100-ROUND BURST firing rate on Vulcan Control Assembly. Trigger the VULCAN Weapon System. Check ICA display.

If Firing Indicators (decimal points on ICA display) appear, replace defective FLASHWESS Assembly and return system to service.

If Firing Indicators (decimal points on ICA display) do not appear, replace defective System Cable and return system to service.

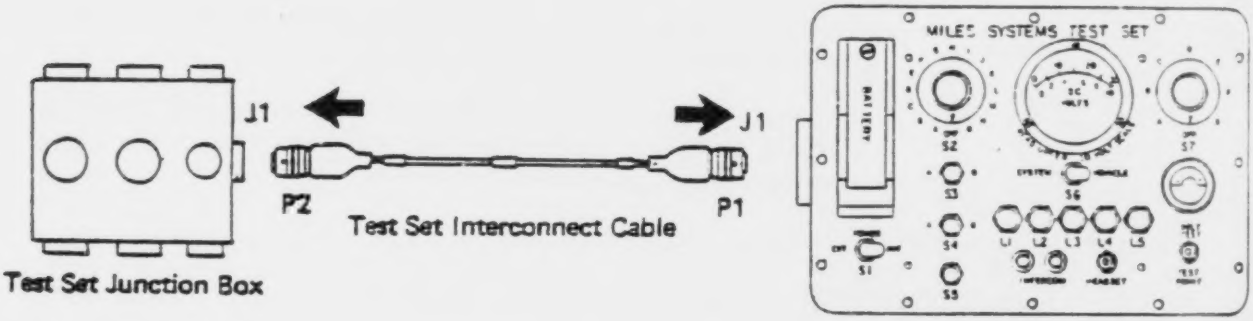
Table 3-2. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

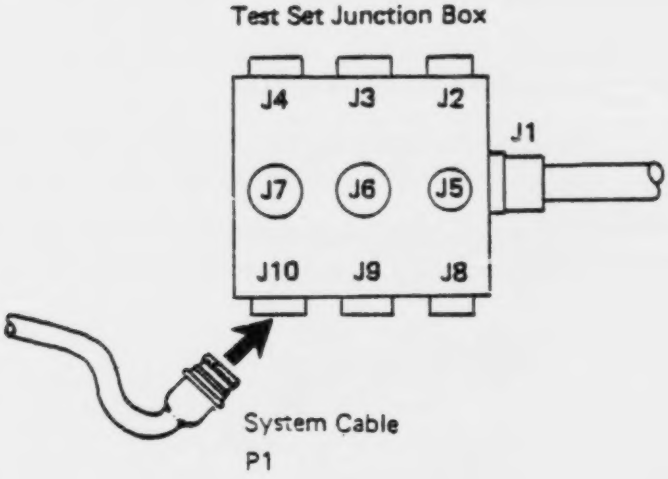
1. INTERFACE CONTROL ASSEMBLY (ICA) (CONT)

(6) ICA Cannot Be Triggered In The HI-BURST LIMIT Rate

Connect the Test Set Interconnect Cable, connector P1, to test set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.


J1
J1
P2
P1
Test Set Interconnect Cable
Test Set Junction Box
MILES SYSTEMS TEST SET
BATTERY
S2
S3
S4
S5
S6
S7
S1
L1
L2
L3
L4
L5

Disconnect System Cable, connector P1, from the ICA and connect to Test Set Junction Box, connector J10.


Test Set Junction Box
J4
J3
J2
J1
J7
J6
J5
J10
J9
J8
System Cable
P1

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Place test set switch S2 in position K.

Place test set switch S6 to the VEHICLE position.

Select a 100-ROUND BURST firing rate. Trigger the VULCAN Weapon System. Read trigger voltage on test set voltmeter.

If voltage reading is 18 to 30 volts, replace defective ICA and return system to service.

If voltage reading is less than 18 volts, VULCAN Weapon System is defective. Correct malfunction (see TM 9-2350-300-10) and return system to service.

(7) ICA Cannot Be Triggered In The LO-NO BURST Rate

Connect the Test Set Interconnect Cable, connector P1, to the test set, connector J1.

Connect Test Set Interconnect Cable, connector P2, to the Junction Box, connector J1.

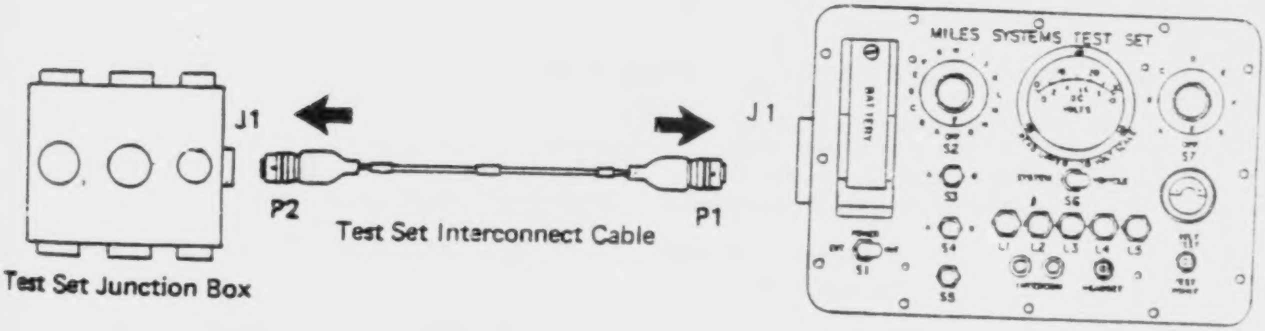

J1
P2
Test Set Interconnect Cable
P1
J1
Test Set Junction Box
MILES SYSTEMS TEST SET
BATTERY
S2
S3
S4
S5
S1
S6
S7
L1
L2
L3
L4
L5

Table 3-2. Troubleshooting – MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

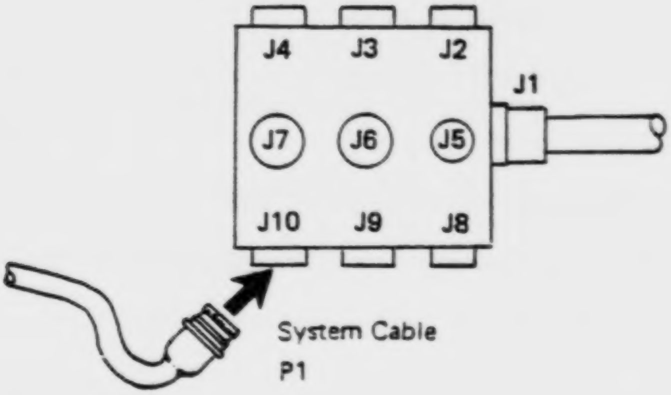
---

1. INTERFACE CONTROL ASSEMBLY (ICA) (CONT)

(7) ICA Cannot Be Triggered In The LO-NO BURST Rate (Cont)

Disconnect System Cable, connector P1, from the ICA and connect to connector J10 on the Test Set Junction Box.

Test Set Junction Box



Place test set switch S6 to the VEHICLE position.

Place test set switch S2 to position K.

Select MANUAL mode and LO-NO BURST firing limit on VULCAN Control Assembly. Trigger the VULCAN Weapon System. Read trigger voltage on voltmeter.

If voltage reading is 6 to 10 volts, replace defective ICA and return system to service.

If voltage reading is less than 6 volts, VULCAN Weapon System is defective. Correct malfunction (see TM 9-2350-300-10) and return system to service.

(8) Rounds Cannot Be Reloaded

Failure of READY ROUNDS DISPLAY indication to increase 30 seconds after PRESS TO RELOAD pushbutton is depressed indicates a problem with the Interface Control Assembly (ICA).

Replace defective ICA and return system to service.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

2. VULCAN TRANSMITTER TEST

(1) One Laser Tube Inoperative

One laser tube inoperative indicates a problem with the Transmitter Assembly.

Replace the defective Transmitter Assembly and return system to service.

(2) Center And One Outside Laser Tube Inoperative

The center laser tube and one outside laser tube inoperative indicates a problem with the Transmitter Assembly.

Replace defective Transmitter Assembly and return system to service.

(3) All Laser Tubes Inoperative

Connect Test Set Interconnect Cable, connector P1, to Test Set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.

Disconnect System Cable, connector P8, from the modulator on the Transmitter Assembly.

Place test set switch S1 to EXT.

Connect System Cable, connector P8, to Test Set Junction Box, connector J7.

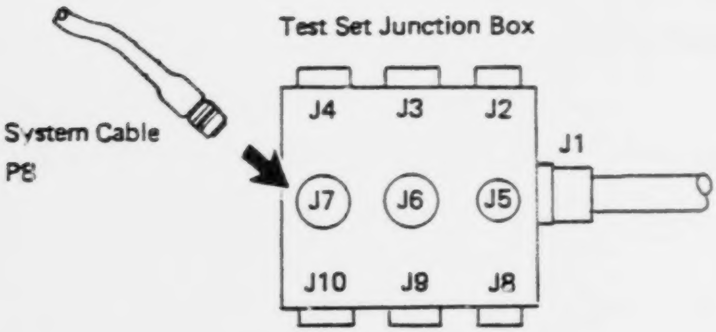


Table 3-1. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

2. VULCAN TRANSMITTER TEST (CONT)

(3) All Laser Tubes Inoperative (Cont)

Select TEST mode by inserting a Controller (Green) Key into the CONTROLLER MODE SELECT key receptacle on the ICA. Rotate controller key counterclockwise, then remove key.

Insert orange weapon key in weapon receptacle on ICA and turn to WEAPON position.

Place VULCAN System in MANUAL mode.

Select MANUAL mode and LO-NO firing rate on VULCAN Control Assembly. Verify sufficient laser rounds remain for testing. Trigger the VULCAN Weapon System. Check test set indicator lights L1, L2, and L3 when trigger is depressed.

CAUTION

DO NOT OPERATE RANGE ONLY RADAR

If lights L1, L2, and L3 flash ON, then OFF, replace defective transmitter and return system to service.

If lights L1, L2, and L3 do not flash ON, then OFF, disconnect System Cable from Test Set Junction Box and reconnect it to the Transmitter Assembly.

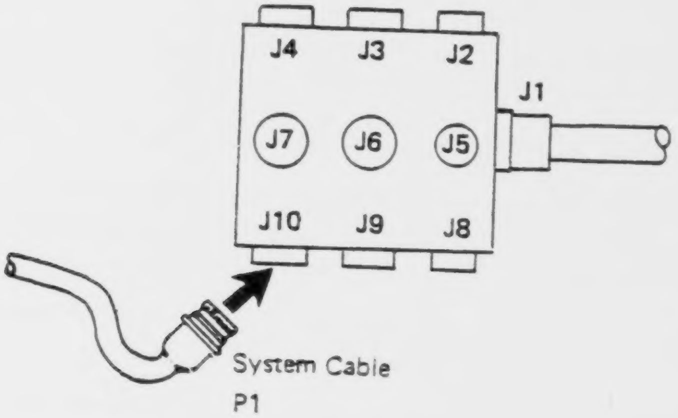
MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Disconnect System Cable, connector P1, from the ICA. Connect to Test Set Junction Box, connector J10.

Test Set Junction Box



Place a MWLD harness with a detector directly in front of the VULCAN transmitter.

Place test set switch S2 to position B.

Momentarily place test set switch S3 to position B.

Verify that the MWLD detector harness responds with a "NEAR MISS" indication.

Momentarily place test set switch S3 to position A.

Verify that the MWLD detector harness responds with a "HIT" indication.

If MWLD alarm responds, replace defective ICA and return system to service.

If MWLD alarm fails to respond, replace defective System Cable and return system to service.

Table 3-2. Troubleshooting – MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

2. VULCAN TRANSMITTER TEST (CONT)

(4) Both Outside Laser Tubes Inoperative

Cover the center laser tube with a helmet, hand or other opaque material.

Place VULCAN System in MANUAL mode.

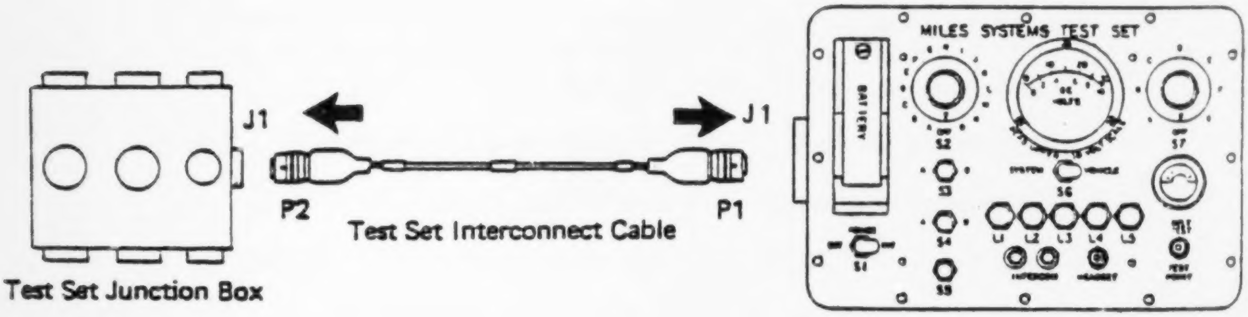
Insert Controller (Green) Key in CONTROLLER TEST key receptacle on modulator. Turn key counterclockwise to select TEST mode.

Place a MWLD harness with a detector directly in front of the transmitter.

Select LO-NO firing rate. Verify sufficient rounds remain for testing. Trigger the VULCAN Weapon System. Verify that the MWLD detector harness responds with either "KILL" or "NEAR MISS" alarms.

If MWLD alarm responds, replace defective Transmitter Assembly and return system to service.

If MWLD alarm fails to respond, connect the Test Set Interconnect Cable, connector P1, to the Test Set, connector J1. Connect Test Set Interconnect Cable, P2, to the Test Set Junction Box, connector J1.


J1
J1
P2
P1
Test Set Interconnect Cable
Test Set Junction Box
MILES SYSTEMS TEST SET
BATTERY
S1
S2
S3
S4
S5
S6
S7
L1
L2
L3
L4
L5

MALFUNCTION

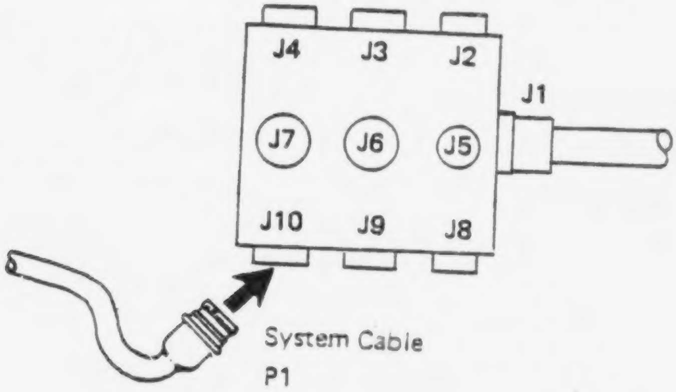
TEST OR INSPECTION

CORRECTIVE ACTION

Place test set switch S1 to EXT position.

Disconnect System Cable, connector P1, from the ICA. Connect to Test Set Junction Box, connector J10.

Test Set Junction Box



Check status of test set indicator light L5.

If light L5 is ON, replace defective System Cable, and return system to service.

If light L5 is OFF, place test set switch S2 to position N. Place test set switch S6 to the VEHICLE position. Check test set voltmeter.

If voltage is less than 10 volts, verify that weapon system is operational.

If weapon system is operational, replace defective System Cable Assembly and return system to service.

If weapon system is not operational, repair as necessary. See TM 9-2350-300-10.

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

WARNING

Do not stand in front of radar when operating.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

2. VULCAN TRANSMITTER TEST (CONT)

(4) Both Outside Laser Tubes Inoperative (Cont)

Select RADAR mode on VULCAN control assembly.

If voltage is between 10 and 18 volts, select LO-NO firing rate on VULCAN Control Assembly. Lock on a target and insure radar READY WHEN LIT indicator is ON. Trigger the VULCAN Weapon System with the RANGE ONLY RADAR operating.

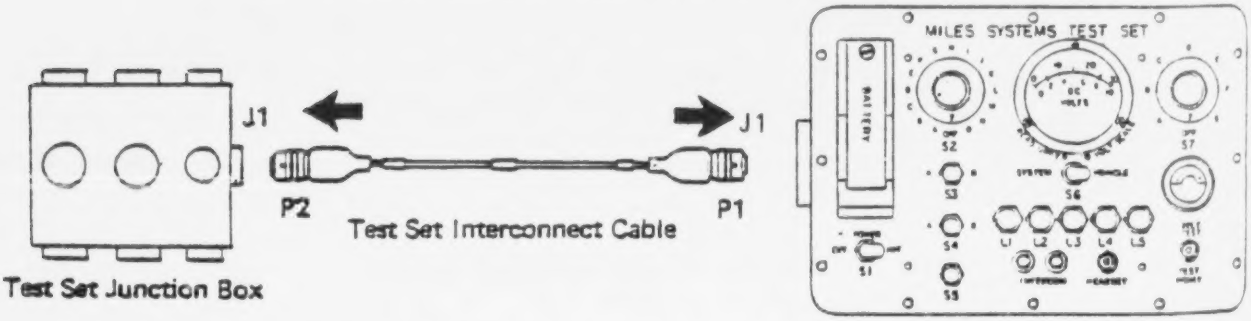
Check test set voltmeter.

If meter reads 0 to 1 volt, replace defective ICA and return system to service.

If meter reads greater than 1 volt, VULCAN Weapon System is defective. Repair malfunction (see TM 9-2350-300-10) and return system to service.

(5) Outside Laser Tubes Operate When Manual Firing Mode Selected

Connect Test Set Interconnect Cable, connector P1, to test set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.


J1
J1
P2
P1
Test Set Interconnect Cable
Test Set Junction Box
MILES SYSTEMS TEST SET
BATTERY
S1
S2
S3
S4
S5
S6
S7
L1
L2
L3
L4
L5

Disconnect System Cable, connector P8, from the Transmitter Assembly.

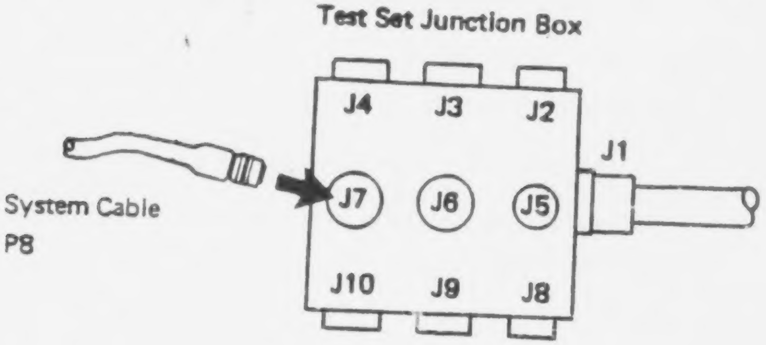
Place test set switch S1 to EXT.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Connect System Cable, connector P8, to Test Set Junction Box, connector J7.


Test Set Junction Box
J4
J3
J2
J1
System Cable
P8
J7
J6
J5
J10
J9
J8

Check test set indicator light L5.

If indicator light L5 is ON, replace defective Transmitter Assembly and return system to service.

If indicator light L5 is OFF, reconnect System Cable, connector P8, to the Transmitter Assembly.

Disconnect System Cable, connector P1, from the ICA. Connect to Test Set Junction Box, connector J10.

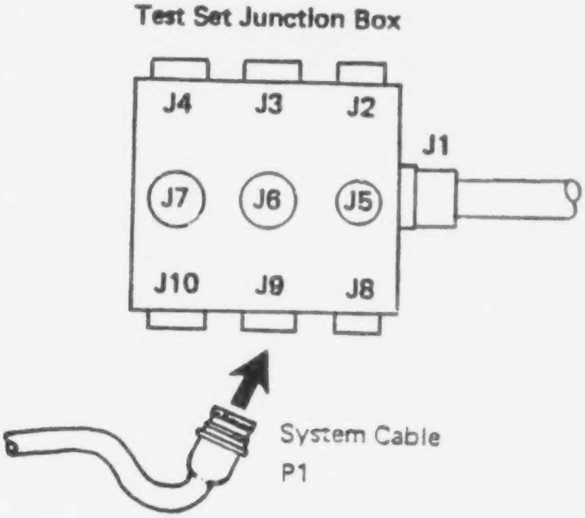

Test Set Junction Box
J4
J3
J2
J1
J7
J6
J5
J10
J9
J8
System Cable
P1

Table 3-2. Troubleshooting – MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

2. VULCAN TRANSMITTER TEST (CONT)

(5) Outside Laser Tubes Operate When Manual Firing Mode Selected (Cont)

Place test set switch S7 to position A.

Check test set indicator lamp L5.

If lamp L5 is ON, replace defective ICA and return system to service.

If lamp L5 does not come ON, replace defective System Cable and return system to service.

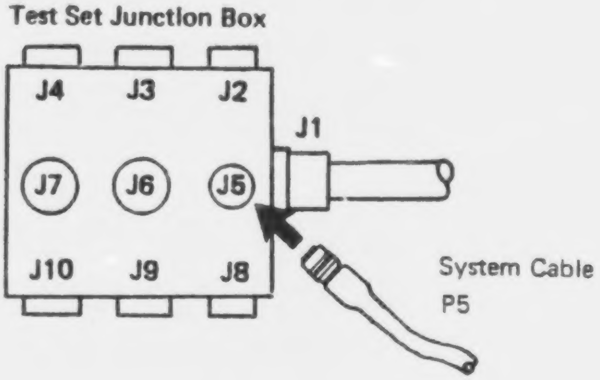
3. FLASHWESS TEST

(1) FLASHWESS Inoperative

Check ICA in NORMAL mode

Connect Test Set Interconnect Cable, connector P1, to test set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.

Disconnect System Cable, connector P5, from the FLASHWESS. Connect it to Test Set Junction Box, connector J5.



MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Place test set switch S6 to the VEHICLE position.

Place test set switch S2 in position 0.

Read voltage on voltmeter.

If voltage reading is less than 18 volts, go to (1.2) FLASHWESS Inoperative – System Cable (page 3-34).

If voltage reading is 18 to 30 volts, insert 9 V battery in test set. Set test set switch S1 to INT.

Select Manual Mode and LO-NO firing rate on VULCAN Control Assembly. Verify sufficient laser ready rounds remain for testing. Trigger the VULCAN Weapon System. Check test set indicator lamp L1.

If lamp L1 does not flash ON/OFF, go to (1.1) FLASHWESS Inoperative – No Indicator Flash (below)

If lamp L1 flashes ON/OFF, set switch S7 to position D.

Select 100-ROUND BURST firing rate on VULCAN Control Assembly. Verify sufficient laser ready rounds remain for testing.

Trigger the VULCAN Weapon System in the 100-ROUND BURST mode. Check test set indicator lamp L2.

If lamp L2 flashes ON/OFF, replace defective FLASHWESS Assembly and return system to service.

Remove battery from Test Set.

If lamp L2 does not flash ON/OFF, go to (1.1) FLASHWESS Inoperative – No Indicator Flash (below).

(1.1) FLASHWESS Inoperative – No Indicator Flash

Disconnect the System Cable from the test set. Reconnect it to the FLASHWESS.

Place test set switch S1 to EXT.

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

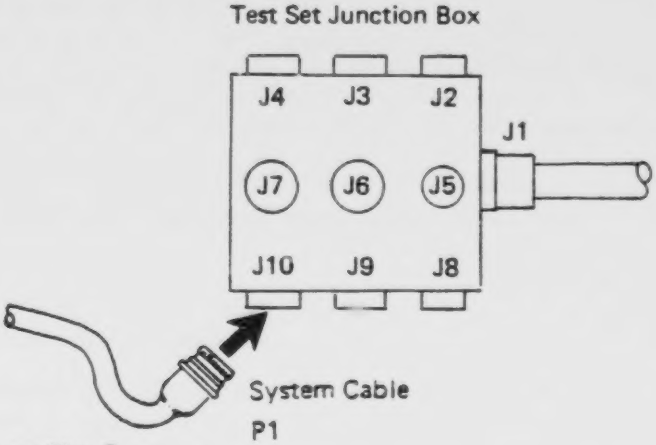
CORRECTIVE ACTION

---

3. FLASHWESS TEST (CONT)

(1.1) FLASHWESS Inoperative - No Indicator Flash (Cont)

Disconnect System Cable, connector P1, from the ICA. Connect to Test Set Junction Box, connector J10.



Set test set switch S7 to position D.

Set test set switch S2 to position N.

Check test set indicator light L2.

If light L2 is not ON, replace defective System Cable and return system to service.

If light L2 is ON, momentarily place test set switch S4 to position A. Observe FLASHWESS. Then momentarily switch to position B. Observe FLASHWESS.

If FLASHWESS operates in both switch positions, replace defective ICA and return system to service.

If FLASHWESS fails to operate in either position, replace defective System Cable and return system to service.

(1.2) FLASHWESS Inoperative - Detection Cable

Verify System Cable connections P2 and P3 (located at Power Distribution Box) are securely fastened.

Place test set switch S2 to position 0.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Read voltage on test set voltmeter.

If meter indicates 18 to 30 volts, return unit to service.

If meter indicates less than 18 volts, verify Vulcan Weapon System is operational.

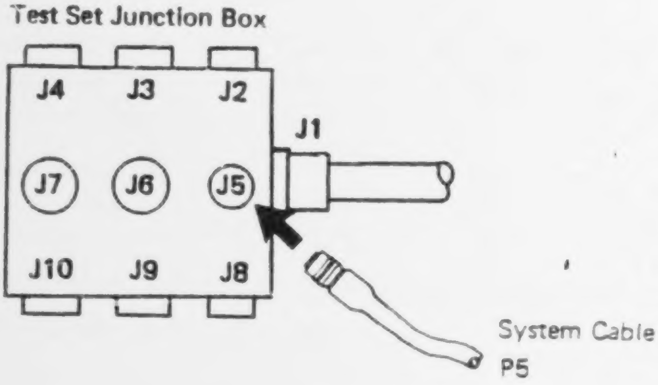
If weapon system is not operational, repair all malfunctions (see TM 9-2350-3000-10) and return system to service.

If weapon system is operational, replace System Cable and return unit to service.

(2) FLASHWESS Inoperative – HI-BURST LIMIT Rate

Connect Test Set Interconnect Cable, connector P1, to Test Set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.

Disconnect System Cable, connector P5, from the FLASHWESS and connect it to connector J5 on Test Set Junction Box.



Place test set switch S1 to EXT position.

Place test set switch S7 to position D.

Select MANUAL mode and 100 round, HI-BURST LIMIT firing rate on VULCAN Control Assembly. Verify sufficient laser firing rounds remain for testing. Trigger VULCAN System. Check test set indicator light L2.

NOTE

Firing indicators on ICA will not come ON.

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

3. FLASHWESS TEST (CONT)

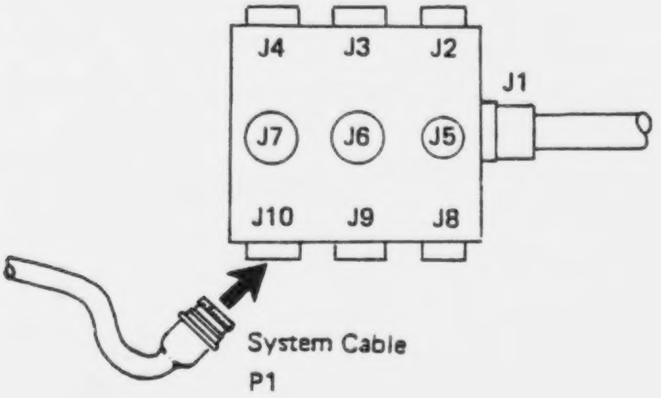
(2) FLASHWESS Inoperative - HI-BURST LIMIT Rate (Cont)

If light L2 flashes ON/OFF, replace defective FLASHWESS and return system to service.

If light L2 does not flash ON/OFF, disconnect the System Cable from the Test Set Junction Box and reconnect it to the FLASHWESS.

Disconnect System Cable, connector P1, from the ICA and connect it to connector J10 on the Test Set Junction Box.

Test Set Junction Box



Momentarily place switch S4 to position B. Check Flashwess response.

If FLASHWESS flashes, replace defective ICA and return system to service.

If FLASHWESS does not flash, replace defective System Cable and return system to service.

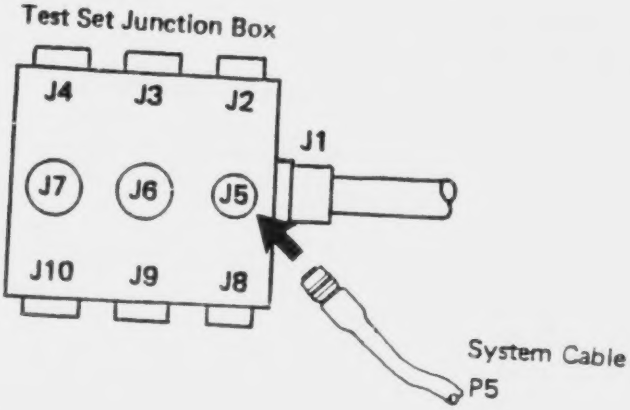
(3) FLASHWESS Inoperative - LO-NO BURST LIMIT Rate

Connect Test Set Interconnect Cable, connector P1, to Test Set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.

Install 9 V battery in test set battery box.

Place test set switch S1 to INT position.

Disconnect System Cable, connector P5, from the FLASHWESS and connect to connector J5 on Test Set Junction Box.



Select MANUAL mode and LO-NO BURST LIMIT firing rate on VULCAN Control Assembly. Verify sufficient laser ready firing rounds remain for testing. Trigger VULCAN system. Check test set indicator light L1.

NOTE

Firing indicators on ICA will not come on.

If light L1 flashes ON/OFF, replace defective FLASHWESS and return system to service.

If light L1 does not flash ON/OFF, disconnect the System Cable from the Test Set Junction Box and reconnect it to the FLASHWESS.

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

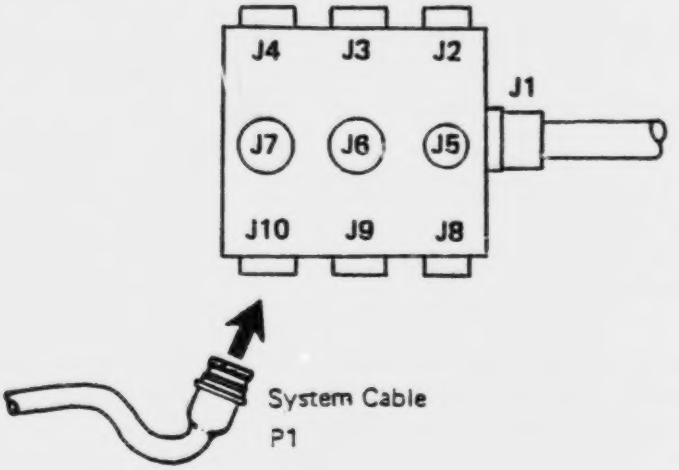
---

3. FLASHWESS TEST (CONT)

(3) FLASHWESS Inoperative - LO-NO BURST LIMIT Rate (Cont)

Disconnect System Cable, connector P1, from the ICA and connect it to connector J10 on the Test Set Junction Box.

Test Set Junction Box



Momentarily place switch S4 to position A. Check FLASHWESS response.

If FLASHWESS flashes, replace defective ICA and return system to service.

If FLASHWESS does not flash, replace defective System Cable and return system to service.

4. CONTROL INDICATOR ASSEMBLY (CIA)

(1) Display Is Blank

Disconnect the CVKI Cable, connector P11, from the battery box. Pause one (1) second and reconnect. Check display

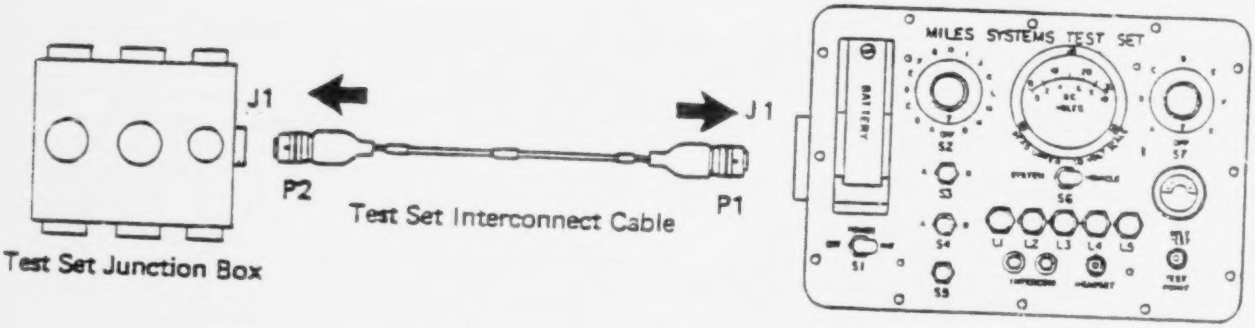
If display indication is 00, return system to service.

MALFUNCTION

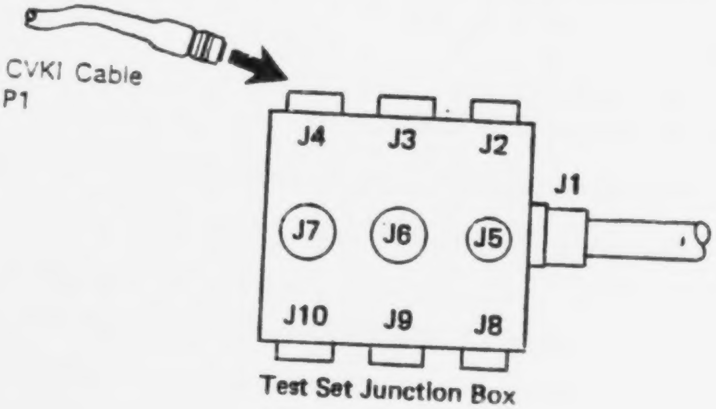
TEST OR INSPECTION

CORRECTIVE ACTION

If display is still blank, connect Test Set Interconnect Cable, connector P1, to test set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.


J1
P2
Test Set Interconnect Cable
P1
J1
Test Set Junction Box
MILES SYSTEMS TEST SET
BATTERY
S2
S3
S4
S1
S5
S6
S7
L1
L2
L3
L4
L5

Disconnect CVKI Cable, connector P1, from the CIA. Connect it to connector J4 on the Test Set Junction Box.


CVKI Cable
P1
J4
J3
J2
J1
J7
J6
J5
J10
J9
J8
Test Set Junction Box

Place test set switch S1 to EXT position.

Place test set switch S6 to the SYSTEM position.

Read voltage on the voltmeter.

If voltage reading is 8.5 to 13 volts, replace defective CIA and return system to service.

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

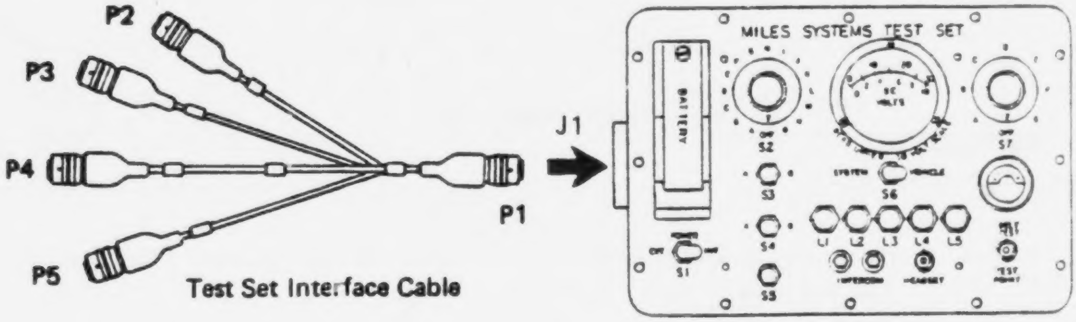
---

4. CONTROL INDICATOR ASSEMBLY (CIA)

(1) Display Is Blank (Cont)

If voltage reading is less than 8.5 volts, disconnect the Test Set Interconnect Cable from the test set.

Connect Test Set Interface Cable, connector P1, to the test set, connector J1.


P2
P3
P4
P5
P1
Test Set Interface Cable
J1
MILES SYSTEMS TEST SET
BATTERY
S1
S2
S3
S4
S5
S6
S7
SYSTEM
VEHICLE
L1
L2
L3
L4
L5
INTERCOM
HEADSET
TEST POINT

Disconnect CVKI Cable, connector P11, from battery box. Connect battery box to Test Set Interface Cable, connector P4.

Place test set switch S6 to the SYSTEM position.

Read voltage on test set voltmeter.

If voltage reading is 8.5 to 13 volts, go to troubleshooting malfunction (1.1), Display Blank - Belts/CVKI (see page 3-41).

If voltage is less than 8.5 volts, install two new 6 V batteries in the battery box.

Read voltage on test set voltmeter.

If voltage reading is 8.5 to 13 volts, discard old batteries and return system to service.

If voltage reading is less than 8.5 volts, replace defective battery box and return system to service.

MALFUNCTION

TEST OR INSPECTION

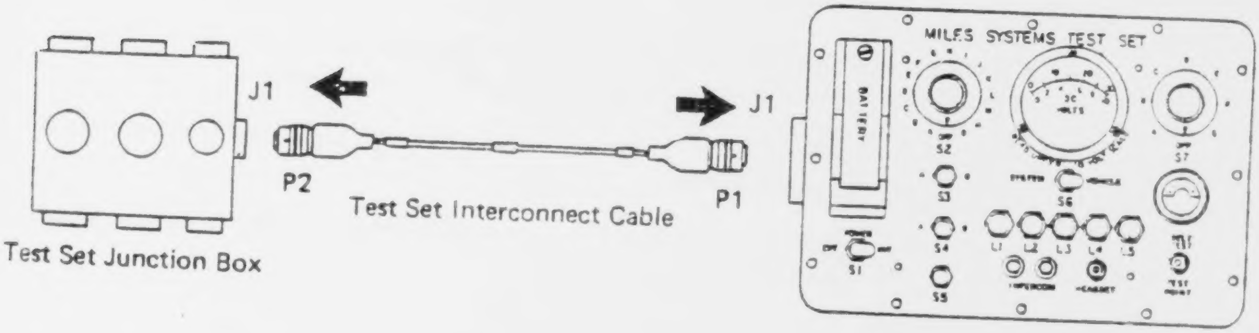
CORRECTIVE ACTION

4. CONTROL INDICATOR ASSEMBLY (CIA)

(1.1) Display Is Blank – Batteries/Belts/CVKI

Disconnect Test Set Interface Cable from Test Set.

Reconnect Test Set Interconnect Cable, connector P1, to the test set, connector J1. Ensure CVKI Cable, connector P1, is still connected to Test Set Junction Box, connector J4.


J1
J1
P2
Test Set Interconnect Cable
P1
Test Set Junction Box
MILES SYSTEMS TEST SET
BATTERY
VOLTS
S1
S2
S3
S4
S5
S6
S7
L1
L2
L3
L4
L5

Reconnect battery box to CVKI Cable.

Disconnect CVKI cable, connector P10, from rear detector belt segment.

Read voltage on test set voltmeter.

If voltage is 8.5 to 13 volts, replace defective rear belt and return system to service.

If voltage is less than 8.5 volts, reconnect rear belt segment. Disconnect CVKI cable, connector P4, from right side detector belt segment. Read voltage on test set voltmeter.

If voltage is 8.5 to 13 volts, replace defective right side belt and return system to service.

If voltage is less than 8.5 volts, reconnect right side belt segment. Disconnect CVKI cable, connector P2, from left side detector belt segment. Read voltage on test set voltmeter.

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

4. CONTROL INDICATOR ASSEMBLY (CIA) (CONT)

(1.1) Display Is Blank - Batteries/Belts/CVKI (Cont)

If voltage is 8.5 to 13 volts, replace defective left side belt and return system to service.

If voltage is less than 8.5 volts, reconnect left side belt segment. Disconnect CVKI cable, connector P3, from front detector belt segment. Read voltage on test set voltmeter.

If voltage is 8.5 to 13 volts, replace defective front belt and return system to service.

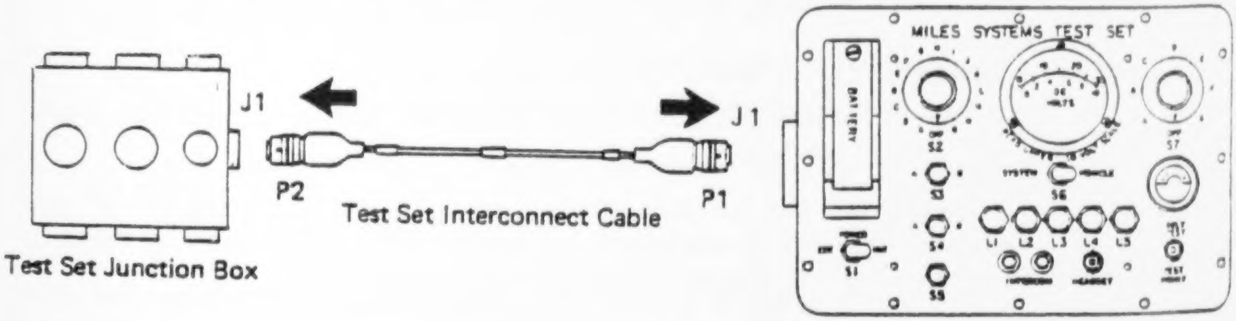
If voltage is less than 8.5 volts, reconnect front belt segment. Disconnect CVKI cable, connector P3, from CVKI Assembly. Read voltage on test set voltmeter.

If voltage is 8.5 to 13 volts, replace defective CVKI Assembly and return system to service.

If voltage is less than 8.5 volts, replace defective CVKI cable and return system to service.

(2) Display Does Not Indicate "88"

Connect Test Set Interconnect Cable, connector P1, to the test set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box,


J1
J1
P2
P1
Test Set Interconnect Cable
Test Set Junction Box
MILES SYSTEMS TEST SET
BATTERY
S1
S2
S3
S4
S5
S6
S7
SYSTEM
VEHICLE
L1
L2
L3
L4
L5

Place Test Set switch S1 to EXT position.

MALFUNCTION

TEST OR INSPECTION

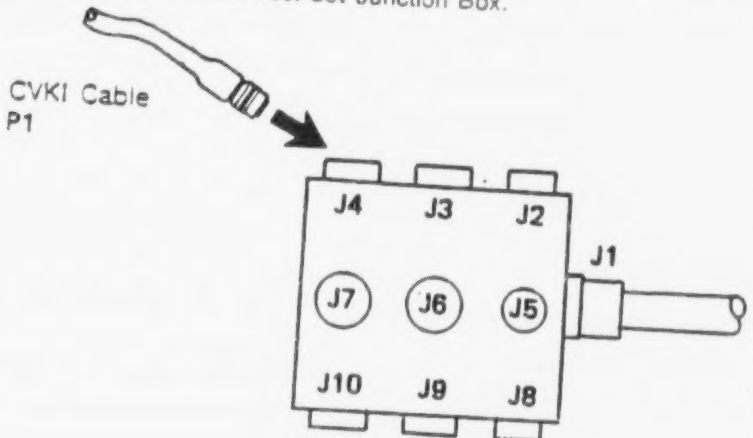
CORRECTIVE ACTION

Insert a Controller (Green) Key into the WEAPON key receptacle on the CIA. Turn counterclockwise to the Controller position. Turn back and remove key.

Turn CIA Console Switch to HIT/KILL. Then turn to SELF TEST. Check display reading.

If display reads 88, return system to service.

If display does not show 88, disconnect CVKI Cable, connector P1, from the CIA, and connect to connector J4 on the Test Set Junction Box.



Test Set Junction Box

Place test set switch S6 to the SYSTEM position.

Read voltage on voltmeter.

If voltage reading is 8.5 to 13 volts, replace defective CIA and return system to service.

If voltage reading is less than 8.5 volts, discard old batteries. Install two new 6 V batteries. Return system to service.

Table 3-2. Troubleshooting – MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

4. CONTROL INDICATOR ASSEMBLY (CIA) (CONT)

(3) Weapon Identification Code Is Not Displayed

Failure of the CIA to display a Weapon Identification Code indicates a problem with the CIA.

Replace defective CIA and return system to service.

(4) NOT READY Light Does Not Light

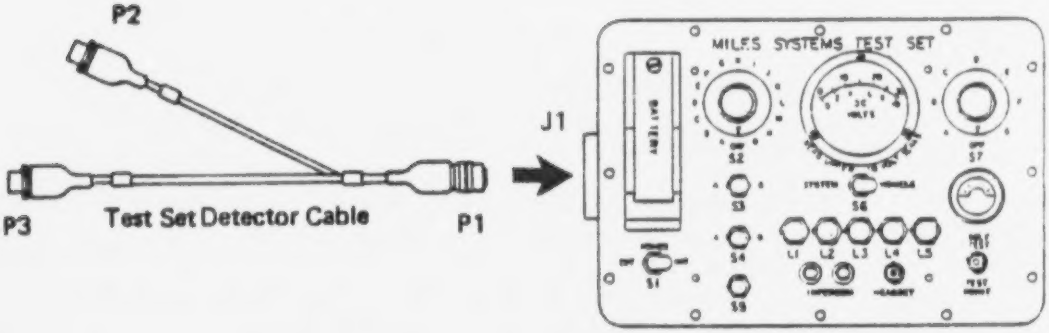
Failure of the NOT READY light to light when a KILL response is given by the CVKI indicates a problem with the CIA.

Replace defective CIA and return system to service.

5. VEHICLE DETECTOR BELTS

(1) One Detector Belt Faulty

Connect Test Set Detector Cable, connector P1, to the test set, connector J1.


P2
J1
P3
Test Set Detector Cable
P1
MILES SYSTEMS TEST SET
S2
S7
S3
S6
S4
L1
L2
L3
L4
L5
S1
S5

Disconnect faulty detector belt.

Connect Test Set Detector Cable, connector P2, to the faulty detector belt. Connect Test Set Detector Cable, connector P3, to the CVKI Cable connector previously attached to the belt.

Place test set switch S6 to the SYSTEM position.

Place test set switch S1 to the EXT position.

Read voltage on voltmeter.

If voltage reading is less than 8.5 volts, replace defective CVKI Cable and return system to service.

If voltage reading is 8.5 to 13 volts, aim a Controller Gun at the faulty detector belt and fire a "NEAR MISS" signal. Check test set BELT TEST meter.

NOTE

When firing the Controller Gun at the faulty Detector Belts, maintain a minimum of 5 feet between the Controller Gun and the Detector Belts. At distances less than 5 feet, a FALSE rate reading is possible.

If BELT TEST meter indicates greater than 96, replace defective CVKI Cable and return system to service.

If BELT TEST meter indicates less than 96, replace faulty detector belt and return system to service.

(2) All Detector Belts Faulty

Connect Test Set Interconnect Cable, connector P1, to the test set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

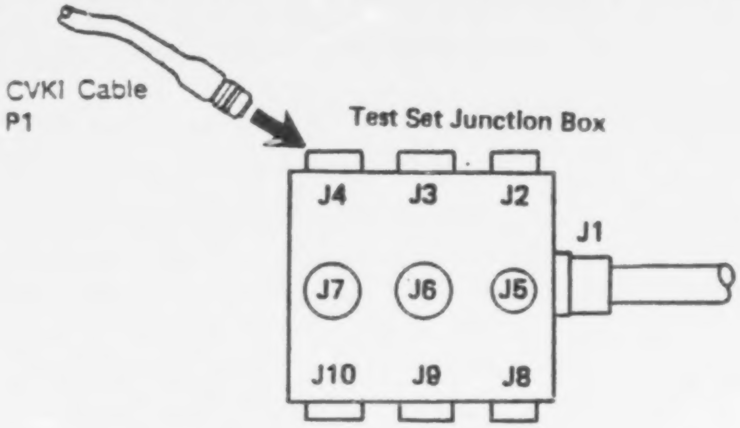
MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

5. VEHICLE DETECTOR BELTS (CONT)

(2) All Detector Belts Faulty (Cont)

Place test set switch S1 to EXT position.

Disconnect CVKI Cable, connector P1, from the CIA. Connect it to Test Set Junction Box, connector J4.



Read the rate from the detector belts on the test set BELT TEST meter. See Table 3-2.1 for determining the acceptable rate for 4 detector belts.

Table 3-2.1

Detector Belt Rate

Number of Belts	Full Sun	Shade
1	0 - 10	0 - 2
2	0 - 15	0 - 4
3	0 - 20	0 - 8
4	0 - 30	0 - 10

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

If rate is acceptable, go to (2.1) All Detector Belts Faulty - Controller Gun Test (see below).

If rate is unacceptable, disconnect one (1) vehicle detector belt.

Read the detector belt rate on BELT TEST meter. See Table 3-2.1 for determining the acceptable rate for 3 detector belts.

If rate is now acceptable, replace the detector belt that was disconnected and return system to service.

If rate is unacceptable, reconnect the detector belt previously disconnected and repeat rate test on each of the remaining detector belts until the faulty belt is isolated.

If all belts are checked and rate is still unacceptable, replace the CVKI Cable and return system to service.

(2.1) All Detector Belts Faulty - Controller Gun Test

Aim a Controller Gun at the detector belts and fire a "NEAR MISS" signal. Check the BELT TEST meter.

NOTE

When firing the Controller Gun at the detector belts, maintain a minimum of 5 feet between the Controller Gun and the detector belts. At distances less than 5 feet, a FALSE rate reading is possible.

If BELT TEST meter indicates greater than 96, replace defective CIA and return system to service.

If BELT TEST meter indicates less than 96, disconnect one vehicle detector belt. Aim a Controller Gun at the remaining detector belts and fire a "NEAR MISS" signal. Check BELT TEST meter.

If BELT TEST meter now reads greater than 96, replace disconnected detector belt and return system to service.

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

---

5. VEHICLE DETECTOR BELTS (CONT)

(2.1) All Detector Belts Faulty - Controller Gun Test (Cont)

If BELT TEST meter still indicates less than 96, reconnect detector belt. Repeat previous test for each of remaining vehicle detector belts.

If BELT TEST meter indicates greater than 96, replace belt that was disconnected previous to test and return system to service.

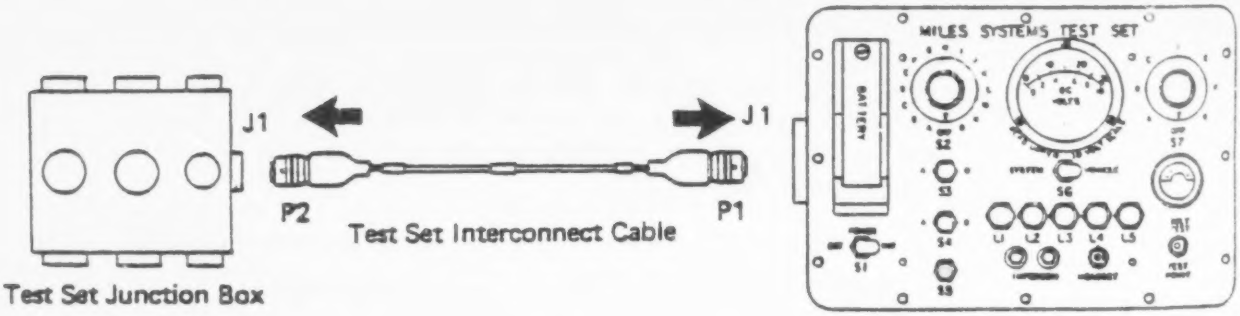
If BELT TEST meter continues to indicate less than 96 for all belts, replace CVKI Cable Assembly.

6. COMBAT VEHICLE KILL INDICATOR (CVKI)

(1) CVKI Fails To Operate

Check that the vehicle master power switch is ON.

Connect Test Set Interconnect Cable, connector P1, to the test set, connector J1. Connect Test Set Interconnect Cable, connector P2, to Test Set Junction Box, connector J1.


J1
J1
P2
P1
Test Set Interconnect Cable
Test Set Junction Box
MILES SYSTEMS TEST SET
BATTERY
S1
S2
S3
S4
S5
S6
S7
L1
L2
L3
L4
L5

MALFUNCTION

TEST OR INSPECTION

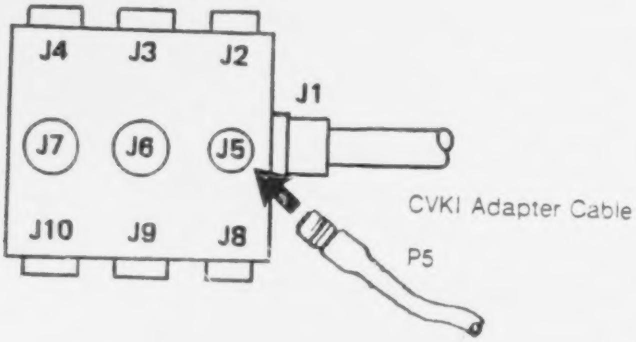
CORRECTIVE ACTION

Insert 9 V battery in test set battery box.

Place test set switch S1 to INT position.

Disconnect CVKI Adapter Cable, connector P5, from the CVKI. Connect to Test Set Junction Box, connector J5.

Test Set Junction Box



Place test set switch S6 to the VEHICLE position.

Place test set switch S2 to position O.

Read voltage on test set voltmeter.

If voltage reading is less than 18 volts, check VULCAN's electrical system for malfunction. See TM 9-2350-300-10. Repair defect and return system to service.

If there is no voltage reading, go to (1.1) CVKI Fails to Operate – Voltage Check (page 3-50).

If voltage reading is 18 to 30 volts, disconnect CVKI Cable, connector P5, from the CVKI Adapter Cable. Connect the CVKI Cable to connector J5 on the Test Set Junction Box.

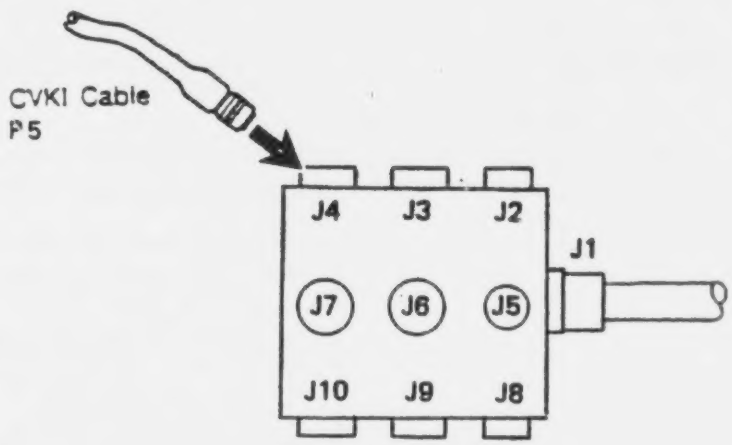
Table 3-2. Troubleshooting – MILES System Test Set (Cont)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

---

6. COMBAT VEHICLE KILL INDICATOR (CVKI) (CONT)

(1) CVKI Fails To Operate (Cont)



Test Set Junction Box

Read voltage on test set voltmeter.

If voltage reading is 18 to 30 volts, replace defective CVKI Adapter Cable and return system to service.

If voltage reading is less than 18 volts, check all Dome Light CVKI Cable electrical connections at the 24 V power connection or dome light. The Grounding Lug should be in contact with bare metal. The dome light will illuminate when connections are properly made.

Retest voltage on voltmeter.

If reading is 18 to 30 volts, return system to service.

If reading is less than 18 volts, replace defective CVKI Cable and return system to service.

(1.1) CVKI Fails To Operate – Voltage Check

Insert 9 V battery in test set. Place test set switch S1 to INT position.

Place test set switch S7 at E position.

Insert a Vehicle (Orange) Key into CIA WEAPON key receptacle. Turn clockwise to WEAPON position.

MALFUNCTION

TEST OR INSPECTION

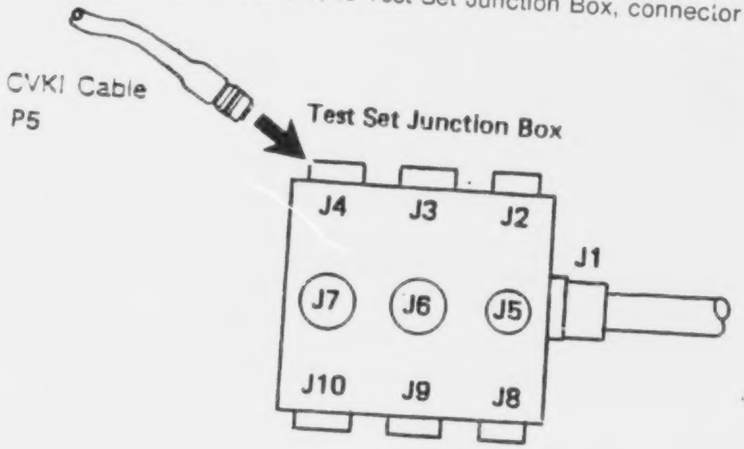
CORRECTIVE ACTION

Check test set light L2.

If light L2 flashes ON/OFF, replace defective CVKI and return system to service.

If light L2 does not flash ON/OFF, disconnect the CVKI Adapter Cable from the Test Set Junction Box and disconnect the CVKI Cable, connector P5, from the CVKI Adapter Cable, connector P5.

Connect the CVKI Cable, connector P5, to Test Set Junction Box, connector J5.



Check test set indicator light L2.

If light L2 flashes ON/OFF, replace defective CVKI Adapter Cable and return system to service.

If light L2 does not flash ON/OFF, disconnect the CVKI Cable from the Test Set Junction Box.

Reconnect the CVKI Cable, connector P5, to the CVKI Adapter Cable, connector J5. Reconnect CVKI Adapter Cable, connector P5 to the CVKI.

Place Test Set switch S1 to EXT position.

Disconnect CVKI Cable, connector P1, from the CIA and connect to Test Set Junction Box, connector J4.

Table 3-2. Troubleshooting - MILES System Test Set (Cont)

MALFUNCTION

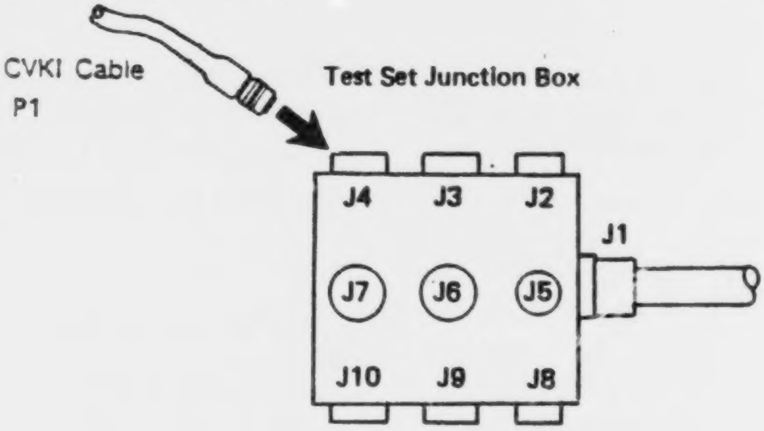
TEST OR INSPECTION

CORRECTIVE ACTION

---

6. COMBAT VEHICLE KILL INDICATOR (CVKI) (CONT)

(1.1) CVKI Fails To Operate - Voltage Check (Cont)



Place test set switch S7 to position G. Momentarily depress test set switch S5. Check CVKI response. (Test Set indicator lamp L4 may come on. This has no effect on troubleshooting.)

If CVKI flashes, replace defective CIA and return system to service.

If CVKI does not flash, replace defective CVKI Cable and return system to service.

7. INTERCOM

(1) Intercom Fails To Operate

Insert 9 V battery in Test Set Battery Box and place test switch S1 to the INT position.

Insert the two CVKI Cable Intercom wires into the INTERCOM jacks located on the Test Set.

Insert a Vehicle (Orange) Key into the WEAPON key receptacle on the CIA. Turn clockwise to SELF KILL the system. Turn back and remove key.

Check test set BELT TEST meter.

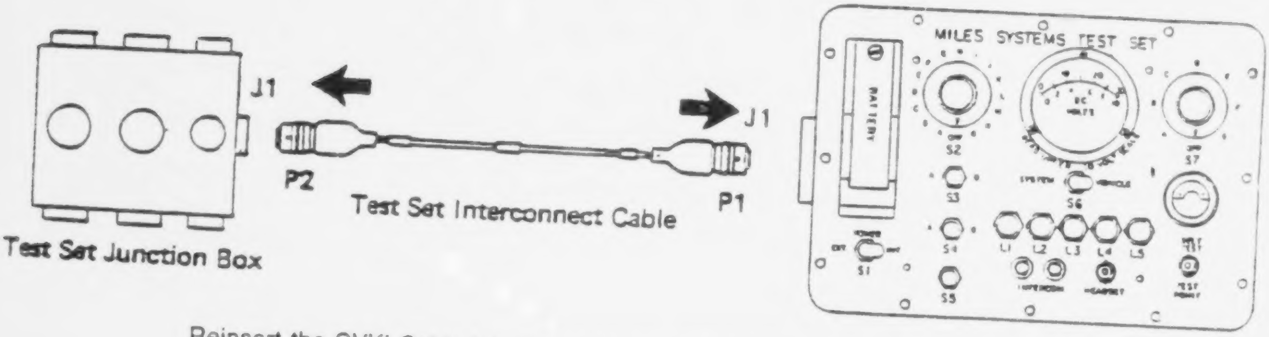
If BELT TEST meter indicates greater than 25, check out vehicle's intercom system. Repeat all malfunctions (see TM 9-2350-300-10) and return system to service.

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

If BELT TEST meter indicates less than 25, connect Test Set Interconnect Cable, connector P1, to the test set, connector J1. Connect Test Set Interconnect Cable, connector P2, to the Test Set Junction Box, connector J1.


J1
P2
Test Set Interconnect Cable
P1
J1
Test Set Junction Box
MILES SYSTEMS TEST SET
BATTERY
S2
S3
S4
S5
S6
S7
S1
L1
L2
L3
L4
L5
TEST POINT

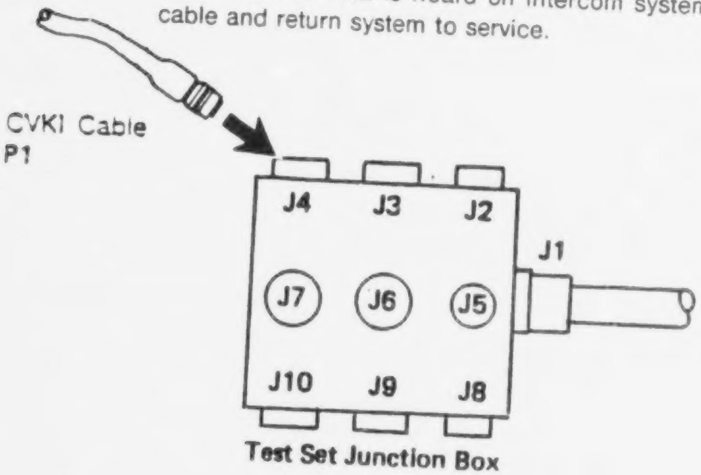
Reinsert the CVKI Cable into the vehicle's 1780 intercom jack.

Disconncet the CVKI Cable, connector P1, from the CIA and connect to connector J4 on the Test Set Junction Box.

Place test set switch S7 in position A. Listen to vehicle's 1780 intercom system.

If an AUDIO TONE is heard on intercom system, replace defective CIA and return system to service.

If no AUDIO TONE is heard on intercom system, replace defective CVKI cable and return system to service.


CVKI Cable
P1
J4
J3
J2
J1
J7
J6
J5
J10
J9
J8
Test Set Junction Box

APPENDIX A

REFERENCES

A-1. SCOPE

This appendix lists all Forms, Field Manuals, Technical Manuals and miscellaneous publications referenced in this manual.

A-2. FORMS

SF 368	Quality Deficiency Report
DA Form 2028-2	Recommended Changes to Equipment Technical Publications
DA Form 2062	Hand Receipt
DA Form 2402	Exchange Tag
DA Form 2404	Equipment Inspection and Maintenance Worksheet

A-3. FIELD MANUALS

FM 21-11	Field Manual: First Aid for Soldiers

A-4. TECHNICAL MANUALS

TM 9-1265-201-10-1HR	Hand Receipt for Simulator System, Firing, Laser: M75 For VULCAN Weapon System
TM 9-1265-370-10-3	Operator's Manual, Multiple Integrated Laser Engagement System (MILES), Simulator System, Firing, Laser: M63 for M113 APC.
TM 9-2350-300-10	Operation and Maintenance Manual (Crew) for Gun, Air Defense Artillery, Self-Propelled
TM 9-2350-310-10	Operator's Manual (Crew) for Gun, Air Defense Artillery, Self-Propelled 20-MM, M163A2
TM 9-5860-225-14&P	Operator, Organizational, Direct Support and General Support Maintenance, Alignment Device, Laser Transmitter, Multiple Range (M3)

A-5. MISCELLANEOUS PUBLICATIONS

AR 310-2	Identification and Distribution of DA Publications
SB 11-6	Dry Battery Supply Data
DA PAM 738-750	The Army Maintenance Management System

APPENDIX B

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

SECTION I. INTRODUCTION

B-1. SCOPE

This appendix lists components of end item and basic issue items for the MILES VULCAN, Self-Propelled, System to help you inventory items required for safe and efficient operation.

B-2. GENERAL

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the MILES M1 VULCAN Self-Propelled System in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the MILES VULCAN, Self-Propelled, System during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

B-3. EXPLANATION OF COLUMNS

The following provides an explanation of columns found in the tabular listings:

a. Column (1) - Illustration Number. This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the National Stock number assigned to the item and will be used for requisitioning purposes.

c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d. Column (4) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5) - Quantity required (Qty rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

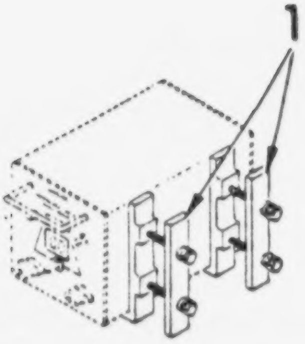
SECTION II. COMPONENTS OF END ITEM

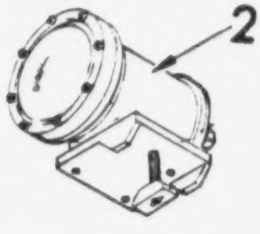
SIMULATOR SYSTEM, FIRING, LASER: M75 FOR SELF-PROPELLED VULCAN

Illustration Number	National Stock Number	Description FSCM and Part Number	U/M	Qty rqr
1	*	Adapter Assy, Simulator System, Laser: Console Vehicle Interface (19200) 9339390	EA	1
2	*	Adapter Assembly Simulator, Weapon Fire (19200) 9339391-2	EA	1

* NOT AVAILABLE ON PUBLICATION DATE

Components of End Item





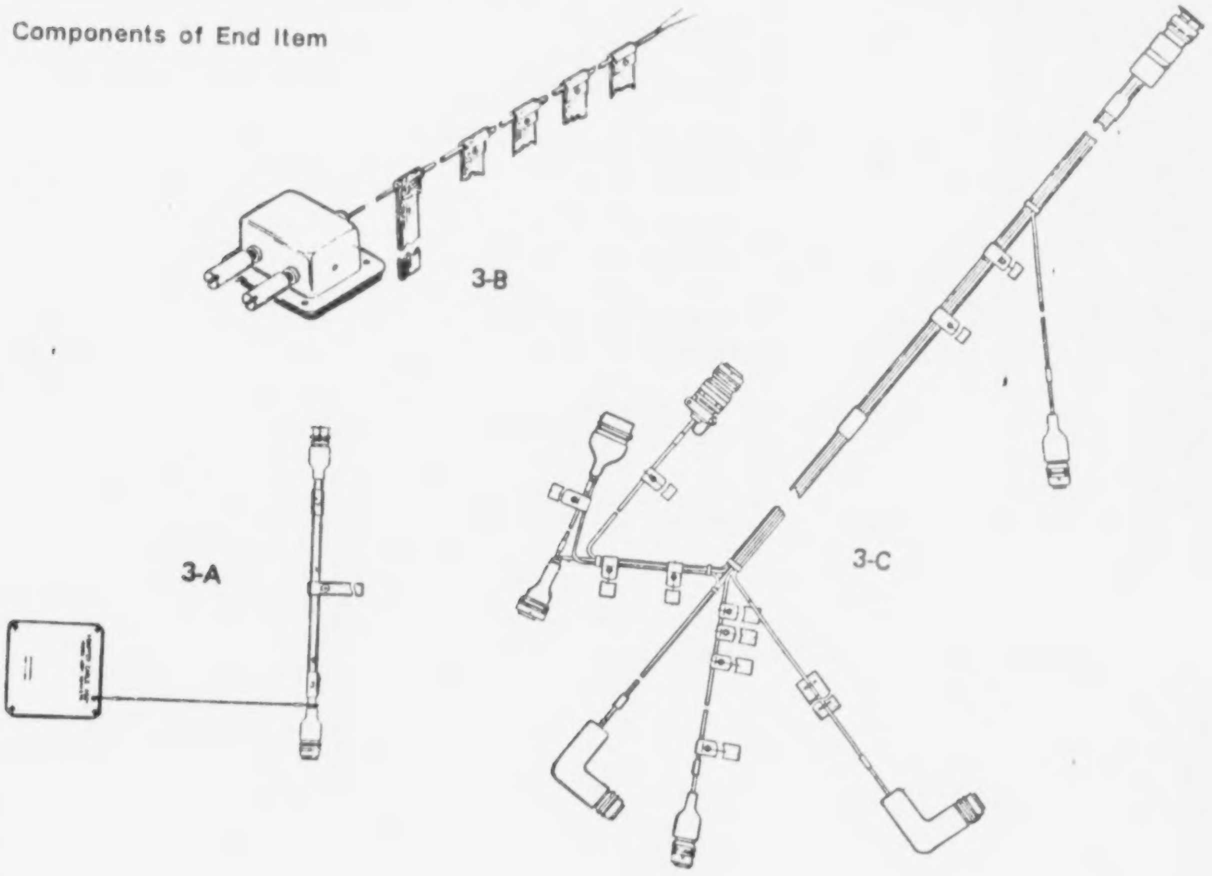
SECTION II. COMPONENTS OF END ITEM

SIMULATOR SYSTEM, FIRING, LASER: M75 FOR SELF-PROPELLED VULCAN

Illustration Number	National Stock Number	Description FSCM and Part Number	U/M	Qty rqr
3	*	Adapter Set, Simulator System, Laser: VULCAN (19200) 9339551	EA	1
	Line Item/Part Number 9339551 consists of the following components:			
3A	*	Cable, Adapter, CVKI (19200) 9344679	EA	1
3B	*	Cable Extension Assembly (19200) 9340126	EA	1
3C	*	Cable Assembly, VULCAN (SP) (19200) 9339791	EA	1

* NOT AVAILABLE ON PUBLICATION DATE

Components of End Item



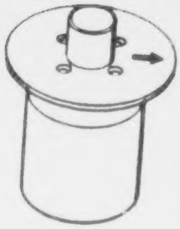
SECTION II. COMPONENTS OF END ITEM

SIMULATOR SYSTEM, FIRING, LASER: M75 FOR SELF-PROPELLED VULCAN (Cont)

Illustration Number	National Stock Number	Description FSCM and Part Number	U/M	Qty rqr
3D	*	Flange, Bottom (19200) 9339727	EA	1
3E	*	Protective Cap (00756) NAS813-28	EA	2
3F	*	Protective Cap (00756) NAS813-32	EA	2
3G	*	Screw, Cap, Hex HD, .375-16 UNC-2A x .625 LG (96906) MS35307-357	EA	2
3H	*	Screw, Cap, Hex Hd, 1/4-20 UNC-2A x 2.00 LG (96906) MS35307-314	EA	8
3I	*	Screw, Socket, HD., 3A x 2.00 LG (00756) NAS1352C06-32	EA	8
3J	*	Universal Adapter Assembly (19200) 9339925	EA	2
3K	*	Washer, Flat 1/4 (96906) MS15795-809	EA	8
3L	*	Washer, Flat No. 3/8 (96906) MS 15795-813	EA	2
3M	*	Washer, Lock 1/4 (96906) MS35338-139	EA	8
3N	*	Washer, Lock No. 3/8 (96906) MS35338-141	EA	2

* NOT AVAILABLE ON PUBLICATION DATE

Components of End Item



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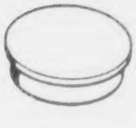

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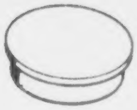

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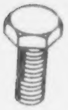

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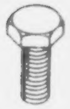

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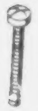

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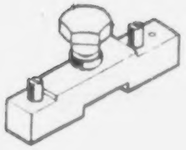

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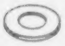

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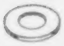

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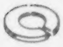

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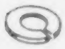


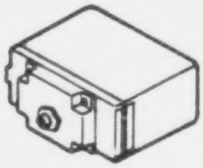
3-N

SECTION II. COMPONENTS OF END ITEM

SIMULATOR SYSTEM, FIRING, LASER: M75 FOR SELF-PROPELLED VULCAN (Cont)

Illustration Number	National Stock Number	Description FSCM and Part Number	U/M	Qty rqr
4	*	Battery Box Assembly (19200) 11749790	EA	2
5	*	Installation Kit Assembly, VULCAN-SP (19200) 9339558	EA	1

Components of End Item



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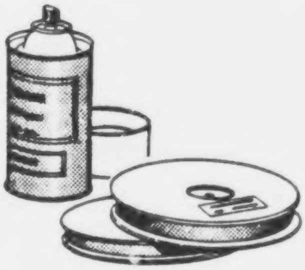


5

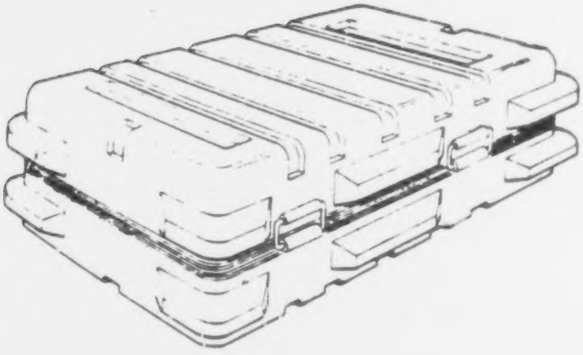
SECTION II. COMPONENTS OF END ITEM

SIMULATOR SYSTEM, FIRING, LASER: M75 FOR SELF-PROPELLED VULCAN (Cont)

Illustration Number	National Stock Number	Description FSCM and Part Number	U/M	Qty rqr
6	*	Transit Case Assembly VULCAN-SP (19200) 9339564	EA	1
7	*	Transmitter Assembly, Simulator System, Laser: VULCAN (19200) 9339554	EA	1
8	*	Transmitter Mount Assembly (19200) 9359418	EA	1

* NOT AVAILABLE ON PUBLICATION DATE

Components of End Item



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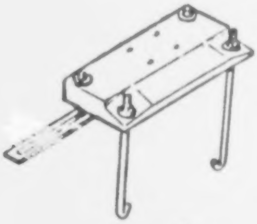

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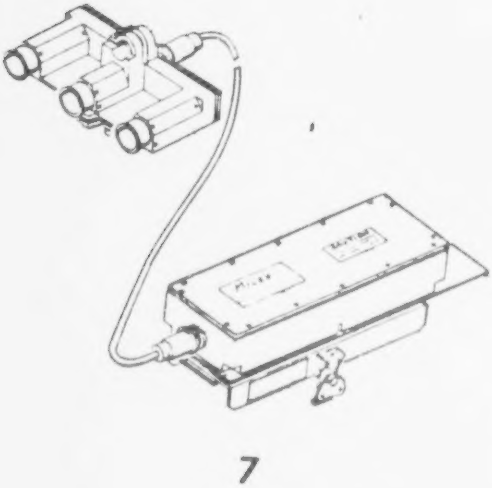

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SECTION III. BASIC ISSUE ITEMS

1 ea.	TM 9-1265-201-10	Operator's Manual f/ Simulator System, Firing Laser: M75 f/ Vulcan Weapon System, Self-Propelled

APPENDIX C

ADDITIONAL AUTHORIZATION LIST

SECTION I. INTRODUCTION

C-1. SCOPE

This appendix lists additional items you are authorized for the support of the MILES VULCAN, Self-Propelled, System.

C-2. GENERAL

This list identifies items that do not have to accompany the MILES VULCAN, Self-Propelled, System and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

C-3. EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name.

SECTION II. ADDITIONAL AUTHORIZATION LIST

National Stock Number	Description (FSCM and Part Number)	U/M	Qty Auth
5860-01-155-5478	Alignment Device, Laser Transmitter Multiple Range (19200) 9339389	EA	1
1265-01-092-0891	Controller's Gun, Simulator System, Laser (19200) 11748811	EA	1
	MILES System Test Set (19200) 9358670	EA	1
5120-00-243-9401	Roller, Hand (24617) 6523520	EA	1
1265-01-077-6082	Simulator System, Firing, Laser: M63 for M113 APC (19200) 11749272	EA	1

APPENDIX D

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

SECTION I. INTRODUCTION

D-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the MILES VULCAN, Self-Propelled, System. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items).

D-2. EXPLANATION OF COLUMNS

a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, Item 5, Appendix D").

b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

c. Column (3) - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Item Number	Level	National Stock Number	Description	U/M
1	C	6135-00-050-3280	* Battery, 6 volt (80058), BA-200/U	EA
2	C	6135-01-063-1978	* Battery, 9 volt (80058), BA-3090/U	EA
3	C	8010-01-040-0947	Primer, Tape (19200), 11749034	CN
4	C	8315-01-111-7170	Tape, Fastener (19200), 11749428	ROLL
5	C	6640-00-240-5851	Paper, Lens (81349), NNN-P-40	PK
6	C	7920-00-205-1711	Cloth	PK
7	C	7920-00-255-7536	Brush, Cleaning	EA

* Dry battery listed is used with the equipment. It will not be preshipped automatically but is to be requisitioned in quantities necessary for the particular organization in accordance with SB 11-6.

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By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12-40, Operator's Maintenance requirements for MILES Simulator Sys, Firing, Laser, M75 (for M63A1 VADS).

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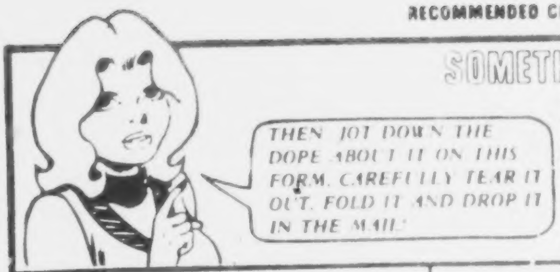
RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS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DATE SENT
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PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-XXXX-XXX-XX	Date of TM	Title of TM

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT
400		183		Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.
512		191		Figure 191, item 3 has the wrong NSN. Supply rejects orders for this item. The NSN shown here is not listed in the AMDF or the MCRL. Please give us the correct NSN and P/N.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN SMITH, S.SGT. 793/XXXX

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John Smith

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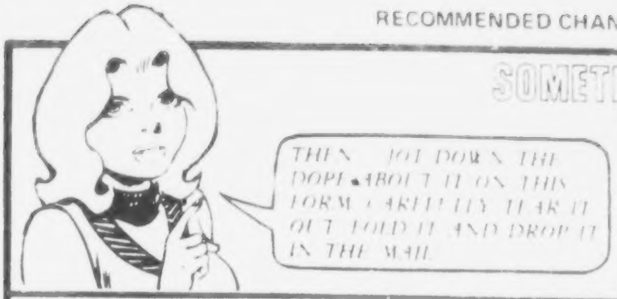
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PUBLICATION NUMBER: TM 9-1265-201-10

PUBLICATION DATE: 15 AUGUST 1988

PUBLICATION TITLE: (MILES) SIMULATOR SYS FIRING, LASER: M75 VULCAN WEAPON SYSTEM SELF-PROPELLED

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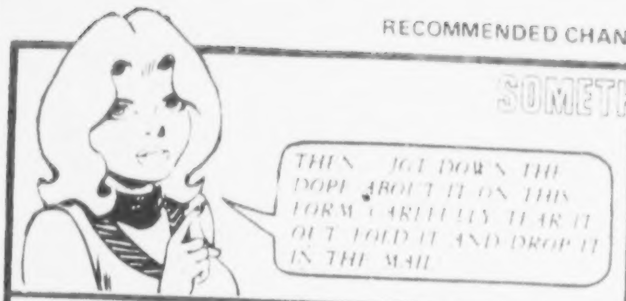
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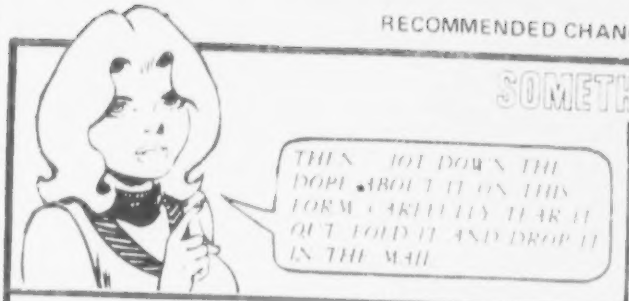
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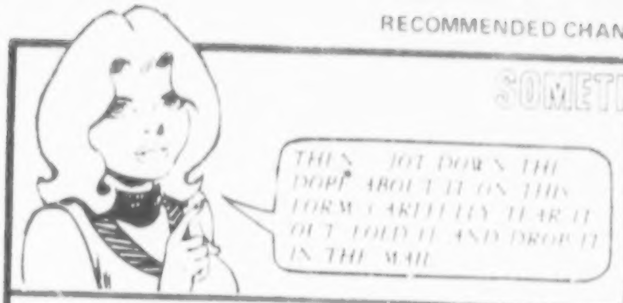
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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

TEMPERATURE

$5/9\,(^\circ F - 32) = {}^\circ C$
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
$9/5\,C^\circ + 32 = F^\circ$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

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